

CERTIFIED COPY

BEFORE THE BOARD OF OIL, GAS AND MINING
DEPARTMENT OF NATURAL RESOURCES
IN AND FOR THE STATE OF UTAH,

FIVE-YEAR PERMIT RENEWAL FOR)
BEAR CANYON MINE, CO-OP) Cause No. ACT/015/025
MINING COMPANY, EMERY COUNTY,)
UTAH)
_____)

VOLUME II

Friday, November 8, 1996, commencing at the
hour of 9:02, a.m., a hearing was held in the above
matter before the Board of Oil, Gas & Mining, at the
Emery County Courthouse, 95 East Main Street, Commission
Chamber, Castle Dale, Utah.



Associated Professional Reporters

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ALSO PRESENT FOR OBJECTORS:

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ALSO PRESENT FOR C.W. MINING MINING COMPANIES:

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KIMLY MANGUM
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ALAN MAYO
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5

1 MR. APPEL: Yes.

2 MR. CARTER: All right.

3 MR. APPEL: Why don't we recall Peter
4 Nielsen.

5 MR. CARTER: Okay.

6 MR. CARTER: Shall we put him under oath
7 again?

8 MR. APPEL: Or just ask him --

9 MR. M. HANSEN: He still is.

10 MR. APPEL: -- if he believes he's still
11 sworn.

12 MR. CARTER: All right.

13 MR. APPEL: Statute of limitations on truth
14 hasn't run yet.

15 MR. CARTER: All right. I'm satisfied.

16

17 PETER NIELSEN,

18

19 recalled as a witness for and behalf of
20 objectors, having previously been sworn,
21 was examined and testified as follows:

22

23 EXAMINATION (RESUMED)

24 BY MR. APPEL:

25 Q Mr. Nielsen, I'd like to take you back a

1 little way before we visit the new material. We were
2 discussing the area geology, and we talked a little bit
3 about changes in the historic recharge pattern that have
4 been caused by the Co-op Mine. Has there been a change
5 from the Co-op Mine?

6 A Yes, I believe there has been.

7 Q Do you know the reasons for that change, in
8 your own mind?

9 A It's a combination of both subsidence and
10 overburdens on the existing aquifers in the Black Hawk
11 and the units above and intercepting the groundwater
12 surface in the Star Point and lower Black Hawk formation.

13 Q So is it your conclusion that they're
14 intersecting flows of the regional aquifer?

15 A Yes.

16 Q Could you describe for us the location of
17 the potentiometric surface?

18 A Yeah. I have an exhibit. Do you want
19 to --

20 Q Yes, why don't we try to introduce that
21 exhibit. You may have two exhibits, actually.

22 A We'll call this one 5, I think. Is that
23 where we're at? We'll call this one 5.

24 MR. CARTER: That would be 5.

25 MR. M. HANSEN: Thanks, Peter.

1 THE WITNESS: This one is similar to the one
2 I presented for the large plate that shows the area of
3 the top of the Star Point sandstone, and I put contours
4 on it. It's the same data here. This map shows the
5 groundwater surface of the Star Point sandstone and the
6 lower Black Hawk using information collected by Co-op
7 Mining and Cypress Mining in this graben area in Gentry
8 Mountain.

9 The wells shown in the middle part of the
10 graph are those that have been monitored by Co-op. I
11 used Big Bear Spring and the well 8626-6 from Gentry
12 Ridge which Cypress Plateau monitors. So this is the
13 groundwater contour at a hundred foot intervals.

14 Q BY MR. APPEL: So this is a plotting of
15 existing data?

16 A Of existing data based on 1994 water levels.

17 Q Okay. And the source of that data was?

18 A Was Co-op's annual hydrologic report,
19 information given to me by Charles Reynold for SDH-1 and
20 SDH-2 and information from the Star Point Mine, Cypress
21 Plateau Mining Company, '94 Annual Hydrological Report.

22 Q Okay. Why don't you explain the lines and
23 shadings on this exhibit?

24 A The red shading at the bottom of the map
25 shows the location of the pillared sections of the Blind

1 Canyon seam. Also the faint lines show the workings in
2 the Blind Canyon seam as of 1995. The squares show the
3 in-mine wells, DH-3, which no longer exists. I think
4 it's been caved and is no longer accessible. The wells
5 SDH-1 and SDH-2 were drilled by Co-op Mining Company
6 north of their permit area right now, and the water
7 levels I used there were initial water levels that they
8 collected before the wells were sealed off. They're no
9 longer accessible.

10 This last well's on Gentry Ridge, and that's
11 Co-op. All the wells are screened in the Spring Canyon
12 sandstone member. The only difference is Big Bear Spring
13 which actually discharges from the Panther sandstone.

14 So that was all used to generate this
15 potentiometric surface or groundwater surface. So you
16 can see a blue line on this map. That blue line is the
17 calculated intercept of the floor of the Blind Canyon
18 seam with the elevation of the water table in the mine.
19 And you can see that the northern extensions of mining
20 based on Co-op's data has intercepted the groundwater
21 elevation surface.

22 Q So the potentiometric is different than it
23 would have been without -- potentiometric surface is
24 different than it would have been absent mining?

25 A I think so. Because if you intercepted the

1 the hundred-foot contours.

2 Q And just so we're absolutely clear on this,
3 you developed the potentiometric contours on Exhibit 5
4 from Co-op's data?

5 A Yes, from Co-op's data.

6 Q And an additional source that you testified
7 to?

8 A And an additional source.

9 Q Okay.

10 A So you can see the potentiometric surface
11 there and I've also plotted the workings in the Blind
12 Canyon seam and the Hiawatha seam here as well the two
13 color points on the south end of this profile here, also
14 using Co-op's information. And you can see the intercept
15 of the Blind Canyon seam northern workings with the
16 potentiometric surface or the groundwater surface in the
17 lower Black Hawk sandstone as well as what will overlap
18 with further mining.

19 It intercepts it as well because of the
20 grading, the Hiawatha intercepts on top of the Star Point
21 sandstone or within a few feet. You're going to
22 intercept that a lot sooner. There is a slight
23 depression in this area where the coal's been mined, and
24 that may indicate that it's been dewatered by mining,
25 where it's intercepted. It's acted as a dewatering

1 point.

2 MR. SMITH: Peter, does this explain why as
3 the mining moved towards the north why more water was
4 encountered.

5 THE WITNESS: Yes.

6 Q BY MR. APPEL: So like in '89 a little water
7 was encountered in the mine. In '91 a lot of water was
8 encountered in the mine?

9 A That's exactly right. The same event
10 occurred in Star Point Mine where I calculated a water
11 table map similar to the one I presented in Exhibit 5 for
12 that area and projected an intercept of the water table
13 and the seam that we were mining and when we intercepted
14 that within a couple hundred feet into the mine, and we
15 reached water on the floor. It was a generally wet mine
16 after that point.

17 There were similar occurrence here. The
18 flows were probably heavy when they first intercepted it
19 that tapered off, probably really steady flow rate of a
20 hundred gallons a minute right now. I'm not sure but it
21 will reach a flow.

22 Q You've got a steady rate flow entering the
23 mine?

24 A Any further mining north will act to dewater
25 the table as well.

1 water and you're intercepting the aquifers, you're
2 essentially dewatering this system, this storage of water
3 in the aquifer.

4 Q Okay. Do you have any other exhibit that
5 shows the interception of the potentiometric surface?

6 A Yeah, we do. I've also generated a
7 cross-section. We'll call this Exhibit 6. It's a
8 cross-section from south to north looking west. Here it
9 is. The line of the cross-section is shown on Exhibit 5
10 as that heavy line from north to south. What the
11 cross-section shows -- do you want me to put the big one
12 up?

13 Q Yes, please.

14 A We've also got the big one here. This
15 area's Huntington Canyon. It goes to Gentry Ridge. I've
16 used the information from the borings in -- the borings
17 in this area, the boring 8626-6 to get the elevation of
18 the Menko shale, the Star Point sandstone and some of
19 these others. This right here, this dash blue line both
20 on this and on the map in there is the profile of the
21 groundwater elevation surface.

22 Q How did you determine that?

23 A Oh, I took a cross-section through the
24 potentiometric surface, a number of data points and then
25 plotted it on here. Actually it directly relates with

1 Q So as the mining proceeds north you expect
2 to reach --

3 A I expect to reach more and more water coming
4 into the mine both in the Blind Canyon and the Hiawatha
5 seam.

6 Q And why is it that there's a steady flow
7 right now rather than continuing surges?

8 A I think the steady flow's there because
9 you're below the potentiometric surface right here. So
10 you've got recharge entering the system back here in
11 Gentry Mountain, McCadden Hollow right here and as the
12 water comes down, it's dewatered by the mine in the
13 northern part of that. So it's a depressed water table
14 in that area.

15 MR. SMITH: Just so I understand. I'm not a
16 hydrologist or geologist. I know a lot of people are and
17 have that training. Just to understand potentiometric
18 surface, how do you define it? Is that the same thing as
19 regional aquifer or how do those terms interrelate?

20 THE WITNESS: The regional aquifer as
21 defined by numerous investigators, Danielson, Waddell,
22 Lines, and several others in this area define the Star
23 Point sandstone and the lower Black Hawk as a regional
24 aquifer on Gentry Mountain, East Mountain; most of the
25 Wasatch plateau, most of the large volume springs in

1 Huntington in the area discharge from the Star Point
2 sandstone.

3 I reviewed the Hiawatha permit which is
4 located kind of northeast of the area we're looking at
5 now, and they did a survey of springs in kind of the same
6 area we're looking at now. The majority of the springs
7 come out of the North Horn formation, and the least
8 amount of springs typically come out of the Star Point
9 sandstone; however, the flow rates for these perched
10 aquifers are generally 8 to 10 gallons a minute, while
11 flow rates out of the Star Point typically are 10 to 100
12 gallons a minute. That's the --

13 (Interruption in the proceedings.)

14 MR. SMITH: I think you were generally
15 saying about the difference between the perched --

16 THE WITNESS: The difference between the
17 perched aquifers with the flow rate of 8 to 10 gallons a
18 minute and the more regional system, the Star Point
19 sandstone and the lower Black Hawk is your average flow
20 rate of ten to a hundred gallons a minute, which is what
21 we see at Little Bear Spring, at Big Bear Spring, lower
22 Tie Fork and upper Tie Fork, all these major springs that
23 discharge from the Star Point sandstone or the lower
24 Black Hawk.

25 MR. SMITH: And the Birch Spring also

1 discharges from there?

2 THE WITNESS: Yes, also from that as well.

3 Q BY MR. APPEL: You mentioned perched
4 aquifers. Aren't they just part of the normal regional
5 system?

6 A Perched aquifers are above the regional
7 aquifer system. They have to by definition to be
8 pumped. There has to be an unsaturated zone between this
9 perched aquifer and the more regional aquifer. However,
10 the perched aquifer goes typically north to south until
11 it intercepts a place where it can come out on the
12 surface or vertical fractures where it can move downward,
13 and that's probably a significant part of the recharge to
14 this more regional aquifer is the vertical flow down
15 through these units to recharge this area right here.

16 Q Okay. There's been some discussion in prior
17 documents and prior hearings that there's a shattered
18 zone that's different than the rest of the regional
19 fractures and joinings. Can you comment on that?

20 A Brown in his report of the stratigraphic
21 framework of the Wasatch Plateau area that we're looking
22 at right now has a shattered zone on his map
23 approximately in this area right here, and previously it
24 was stated that that's the recharge zone for this whole
25 area, and it probably is a recharge zone for that area.

1 But I don't think it's the only recharge
2 zone for this area because he also has shattered zone
3 written in the Joe's Valley graben located west of that
4 area. I think that shattered zone refers to the
5 fracturing and breakage of rocks inside the fault zones.
6 It's not anything particular to this area.

7 If you go up here and look, which we did on
8 the last one, you notice that all this area has
9 continuous fractures vertically, several sets of
10 fractures that you can see in the outcrops. There's no
11 particular reason to see why recharge here is any
12 different than here.

13 The one thing that you did note is that this
14 area's flatter in the shattered zone area versus you get
15 more steep slopes over here, so the amount of recharge
16 may be different because you have maybe more snow
17 accumulation here and potential for recharge than you do
18 here.

19 MR. MAYO: May we ask a few questions?

20 THE WITNESS: But as far as the mechanism, I
21 don't think there's any difference.

22 MR. CARTER: Let me ask them to ask their
23 questions.

24 MR. APPEL: Okay. You want it done now?

25 MR. CARTER: Yeah, let's do that.

1
2 EXAMINATION

3 BY MR. MAYO:

4 Q My name is Alan Mayo, M-a-y-o. I'm with
5 Mayo & Associates. Peter, I've got a couple questions.

6 On Exhibit 5 --

7 A Speak up. I can't hear you.

8 Q On Exhibit 5 you've drawn a series of
9 equipotential lines. What did you use for control on the
10 east and west sides?

11 A I used the control of the fault boundaries
12 on both sides. I used the fault boundaries on either
13 side of this graben structure, both the Trail Canyon
14 fault and the Bear Canyon fault as a shutoff for
15 contouring.

16 Q Let's talk about the 7700-foot contours as
17 an example.

18 A Okay.

19 Q On the west side, how did you determine
20 where that 7700-foot contour should be?

21 A It's shut off over there. It's contoured
22 between SD-42 and SD-41.

23 Q I understand that.

24 A It's a dark line over in that area.

25 Q It shows it solid. What I'm wondering is

1 what did you use for control to physically draw these
2 lines? I see all the wells are pretty much in a straight
3 line.

4 A Yeah.

5 Q So what did you use for the sides?

6 A I didn't use anything for the sides on here;
7 however, previously I did contour this map using upper
8 Tie Fork Canyon and lower Tie Fork Canyon which is west
9 of this, and if you include those points, you get
10 recharge moving towards that fault zone over there. Your
11 gradients shift towards the southwest.

12 Q But there really is no control for --

13 A Not along the faults, no.

14 Q And there's no real control for why those
15 lines are drawn?

16 A Along the faults, no.

17 Q Other than where --

18 A Just between the wells.

19 Q Just between the wells. So that's the only
20 real control we have --

21 A In those wells.

22 MR. CARTER: One at a time now. One at a
23 time.

24 Q BY MR. MAYO: So that's the only real
25 control we have?

1 A That's the real control. There is no data
2 points either east or west of this. There are wells, but
3 there's no water information.

4 Q Okay.

5 A Water levels.

6 Q I had another question relating to your
7 potentiometric surface and the interception of the
8 potentiometric surface by the mining. And the question
9 goes along these lines, is that what specific evidence do
10 you have that there's actually upward flow out of the
11 what you're calling the regional aquifer, that there's
12 actually upward flow out of that into the mine other than
13 the fact the mine has intercepted a potentiometric
14 surface which is not of a water table?

15 A I don't think there's upward flow out of the
16 surface because below the water table it's essentially a
17 saturated zone. The fractures are saturated.

18 Q So what you're telling us then is that the
19 entire coal sequence is saturated as well?

20 A At that point. It would have to be because
21 it's below the water table.

22 Q And so the coal itself does not act as any
23 type of a low-key horizontal boundary?

24 A I don't think so. When I've worked at the
25 mine I've seen water above the coal seam below the coning

1 and seen it come through fractures in the coal seam.

2 Q So you think the Star Point sandstone and
3 the lower part of the Black Hawk is completely saturated?

4 A Below the water table, below this water
5 table.

6 Q Below the potentiometric surface?

7 A Yes, I do. At least the fracturing, because
8 the fracturing -- this is definitely a fracture -- what's
9 the word I'm thinking, fracture-enhanced system.

10 Q Okay. So that I want to make sure I clearly
11 understand what you're proposing here. So that this
12 potentiometric surface then represents not only the Star
13 Point sandstone but it also represents the lower
14 portion --

15 A Lower portion.

16 Q -- of the Black Hawk?

17 A Yes.

18 Q So that if we go into the mine and once we
19 get to the point where the mine intercepts the
20 potentiometric surface, and if we were to continue to
21 mine to the north, that entire sequence above the coal
22 seams and down below the coal seams is all one aquifer?

23 A Yes.

24 Q Okay.

25 A This is the same. The same occurrence

1 happened further north on Gentry Ridge. When we mined
2 below the water table we had wet conditions both out of
3 the floor and out of the roof and out of the coal seam.

4 Q And you viewed above the coal seam and below
5 the coal seam as being exactly the same water?

6 A Mm-hmm, yes.

7 Q And it recharges under exactly the same
8 conditions?

9 A Yes.

10 Q And it's -- oh, okay.

11 A Now there are conditions where you may have
12 a perched aquifer above the coal seam and above in the
13 Black Hawk or higher, but as far as the lower Star Point
14 sandstone and the Black Hawk, it's continuous in this
15 area.

16 Q Okay.

17 A That's the same thing that we had occur even
18 further north. There's no reason to think it wouldn't be
19 any different down here.

20 MR. CARTER: Thank you.

21 MR. M. HANSEN: I have one question. What's
22 the source of your information that the formation below
23 this potentiometric surface is saturated?

24 THE WITNESS: What's my source of
25 information?

1 MR. M. HANSEN: Yeah. What's the source of
2 your information that leads you to that conclusion? I
3 believe that's what you said. Was it the entire
4 sandstone formation below this potentiometric surface
5 line is fully saturated?

6 THE WITNESS: Not fully. This information
7 here is contoured using water levels in the Spring Canyon
8 sandstone which is where the wells are screened in all of
9 these.

10 MR. CARTER: May I? Where is the Spring
11 Canyon sandstone in relation to the Star Point?

12 THE WITNESS: It's the upper member of the
13 Star Point sandstone.

14 MR. CARTER: Okay.

15 THE WITNESS: Right below. It's the basal
16 member next to the Black Hawk. So these wells are in the
17 Spring Canyon sandstone.

18 MR. C. HANSEN: I've got a question. My
19 name is Chris Hansen, H-a-n-s-e-n. This is just a
20 general information question. Is the well that you got
21 your data from in Cypress Plateau completed in the Spring
22 Canyon?

23 THE WITNESS: Yes, it is.

24 MR. C. HANSEN: And when they mined into the
25 groundwater table, did they record any affected springs?

1 Did they notice any wells in the spring?

2 THE WITNESS: This well here declined by
3 about 10 -- well, let me think here. This well
4 declined. I'm thinking it declined in the order of 10
5 feet water level following the movement of the longwall
6 panels south of down this ridge.

7 MR. C. HANSEN: So the well's located to the
8 west of where they were mining, is that correct?

9 THE WITNESS: This well?

10 MR. C. HANSEN: Yes.

11 THE WITNESS: No. It's directly south.
12 They were mining north between these two major faults of
13 this well. This well is the southern well off the permit
14 boundary.

15 MR. C. HANSEN: Were there any springs that
16 they noted that were impacted?

17 THE WITNESS: The one spring, upper Tie Fork
18 flows declined when they started moving down here, yeah.

19 MR. C. HANSEN: That's a well, isn't it?

20 THE WITNESS: It's two shallow seismic holes
21 that are drilled into an old tufa mound, and they
22 declined, yes. That same area there's numerous seeps and
23 springs that come out of the side of the mound at that
24 point.

25 MR. C. HANSEN: Do you recall what the

1 overburden was in that area?

2 THE WITNESS: Of this well up north?

3 MR. C. HANSEN: Mm-hmm.

4 THE WITNESS: I don't right offhand.

5 MR. CARTER: Okay. Mr. Appel?

6

7

FURTHER EXAMINATION

8 BY MR. APPEL:

9 Q Okay. One of the representatives of Co-op
10 was discussing controls, and the -- there were certain
11 well locations here. Isn't one of the problems that
12 we've discovered that there is a lack of monitoring of
13 wells in this area?

14 A Uh-huh.

15 Q The information would be far better if we
16 did have more wells?

17 A Yes.

18 Q So in fact his question leads you to the
19 conclusion that we need more wells?

20 MR. MAYO: Don't lead.

21 THE WITNESS: Yeah. If you look on this
22 Exhibit 5, the well DH-3 is located in an area that's
23 been sealed, so you can't monitor that one any more.
24 SDH-1 north of the mine and SDH-2 were drilled and
25 initial water levels collected, but now they're sealed

1 off, so we don't know where the water is at now. So
2 essentially there's no information there beyond the
3 initial water levels that I received from Co-op.

4 Q BY MR. APPEL: Okay. And they're really in
5 a fairly narrow band?

6 A Meaning?

7 Q Narrow line? Well, what I'm looking at is
8 the extent of the workings. I guess I would say
9 horizontally. Aren't they represented by the wells
10 horizontally? Aren't they?

11 A No. They don't have any upgradient
12 information besides the initial water level ratings
13 inside these two wells.

14 Q How many more wells do you think we need?

15 A Well, they've got three active ones right
16 now. You would think they need one down lowerish in the
17 map to replace DH-4, to monitor groundwater levels north
18 of the mine. That's what was required of us at the other
19 mine.

20 Q Did you say there were problems with the
21 existing wells?

22 A The ones here? The ones they have in-mine?

23 Q Yes. Are they still providing amounts?

24 A Three of them are. 1, 2 and 4.

25 MR. CARTER: Are the only ones. What's

1 currently happening with SDH-1 and SDH-2?

2 THE WITNESS: I think you recorded the
3 initial water levels after you constructed the wells and
4 since then they've sealed off or something.

5 MR. REYNOLDS: We've got SDH-2, simply we
6 found due to some clay squeezing that it's cut off our
7 ability to measure. We are measuring the water levels.
8 We are planning on replacing -- are replacing the tubing
9 in the well, and that should provide us access. SDH-1 we
10 have run into a plug in the well that we're not quite
11 sure what's plugged off. The well has not been sealed,
12 and we're still attempting to make a determination as to
13 what it would take to reopen that.

14 MR. CARTER: Thank you.

15 Q BY MR. APPEL: Well, we've been talking
16 about the area geology. Do you have a conclusion
17 concerning the effect on the water sources of the
18 objectors from the mining in this particular seam?

19 A Yeah. I think based on the water level
20 information that we have here that any further northward
21 mining's going to deplete from the water. If you've
22 got -- if you look, for instance, at a premining
23 instance where you've got perched aquifers, you've got
24 vertical movement of water between the perched and the
25 regional aquifer and southward movement of water in the

1 perched or not the perched, the regional aquifer, you've
2 got water moving north to south, whether it's perched or
3 in the regional aquifer.

4 You go in there with the mine, you either
5 intercept perched aquifers or you're intercepting
6 vertical flow or you're mining into the regional
7 groundwater level there. You're removing a volume of
8 water that was there before that was discharging in this
9 southern area, either at springs or at Huntington Creek
10 or someplace. And that's just a simple removal of
11 water.

12 If you've got a certain fixed amount of
13 water there, a hundred acre feet, and you're removing 40
14 acre feet by intercepting perched systems or the regional
15 water surface system, you've removed that water from the
16 string.

17 MR. CARTER: Let me ask a question. Big
18 Bear Spring is not the only point of discharge for all of
19 that water?

20 THE WITNESS: No.

21 MR. CARTER: I mean --

22 THE WITNESS: Birch Springs would be another
23 discharge to the regional aquifer system as far as that
24 point as well as faulting on either side could possibly
25 be a conduit for water.

1 MR. CARTER: Do you have any idea of the
2 water budget for this aquifer between these faults? In
3 other words, how many acre feet of water do you believe
4 are being recharged and ultimately surfacing somewhere?
5 I'm just curious if you --

6 THE WITNESS: Yeah. Well, we didn't do a
7 universal survey of Huntington Creek in this area;
8 however, Danielson did back in '89. In the length of the
9 river immediately I think below Little Bear Canyon to
10 Trail Canyon, he had a net loss of I believe 2.2 acre
11 feet of water, and then from Trail Canyon to below Rilda
12 Canyon he had a net gain of 2.8 CFS. Excuse me. CFS.

13 MR. M. HANSEN: That was a net loss.

14 MR. CARTER: Little Bear Canyon which is
15 north of Trail Canyon.

16 MR. MAYO: Okay. A net loss of water there,
17 and then a net gain of water?

18 THE WITNESS: Between Trail Canyon and Rilda
19 Canyon which is just south of Bear Creek Canyon.

20 MR. MAYO: This was done in 1989?

21 THE WITNESS: By Danielson as part of his
22 report of hydrology in this area.

23 MR. MAYO: And no similar studies have been
24 done since, such --

25 MR. CARTER: Just a minute. This is

1 becoming a free-for-all. I think first of all we all
2 need to slow down now, including me, but I don't know if
3 you were done with your questions, and before everybody
4 jumps in I think people are entitled to go to the end of
5 their inquiry. I sense you may not have been done and
6 then Mr. Mayo jumped in and everybody else. We won't
7 interrupt them or you or anybody else.

8 MR. APPEL: I'm finished, so we'll turn to
9 the Co-op table. Go ahead.

10 MR. MAYO: I have a couple questions, and
11 one would be a follow-up.

12 Do you have any calculations as to the
13 amount of the water intercepted in the mine relative to
14 changes in discharge of either Big Bear or Birch Spring?

15 THE WITNESS: As a matter of fact we have.
16 We've calculated a hydrologic budget including both
17 recharge potential discharge out of Trail Canyon, Bear
18 Canyon, potential discharge into Huntington Canyon, and
19 including mine discharge as well.

20 MR. MAYO: Okay. Are you going to present
21 that data?

22 THE WITNESS: We was going to get to it.

23 MR. MAYO: Okay.

24 THE WITNESS: If it came up. Yeah. We have
25 that data.

1 MR. MAYO: My next question had to do with
2 the gain of water in Huntington Canyon. Over the area
3 that it was reported that there was a gain in flow, how
4 much of that was in the Menko shale?

5 THE WITNESS: That I don't know right
6 offhand. Yeah, that -- I can't answer that. I don't
7 know. Menko shale. All I looked at was a net increase
8 of .6 cubic feet of water per minute between the upper
9 part and then the area through the fault zone in here.
10 And I don't know, maybe I need to -- we can point those
11 out on those maps that I -- we had photocopied. We
12 could show that.

13 MR. APPEL: Why don't you do that.

14 THE WITNESS: Let's do that just to make
15 things a little easier.

16 MR. CARTER: Here's a paper version if you
17 want to mark it.

18 THE WITNESS: That area you're talking
19 about, this area, Little Bear Canyon is located right
20 here just south of Tie Fork and his stream survey started
21 just below Little Bear Spring and went to just about
22 Trail Canyon and that's where he had the net gain or net
23 loss of 2.2 CFS.

24 And then he measured from Trail Canyon to
25 Rilda Canyon down in here and had a net gain of 2.8 CFS,

1 the difference being .6 cubic feet of water.

2 MR. CARTER: I would just note that your
3 cross-section shows the Menkos as the rock cropping out
4 in the bottom of the canyon?

5 THE WITNESS: Yes. It does crop out in the
6 bottom of the canyon.

7 MR. CARTER: In your cross-section?

8 THE WITNESS: Yeah. This map here, it shows
9 this heavy line right here is the top of the Star Point
10 sandstone in which I didn't mark the top of the Menko
11 shale, but the outcrops that he measured was in the Menko
12 sandstone, Menko shale. That's where the creek goes
13 through in Huntington Canyon. Most of the discharge
14 occurring from the top of Electric Lake down to here is
15 Menko shale.

16 MR. APPEL: Okay. A moment to confer.

17 Q Okay. You've given us your conclusion based
18 upon your review of the area geology. Have you performed
19 any other studies that support your conclusion concerning
20 interference?

21 A Yeah. We did -- we sampled groundwater
22 from both locations in the mine and from several springs
23 around the mining area. The springs we sampled and have
24 shown on Table 1 of the exhibit we handed out last time.
25 I think it's Exhibit 4.

1 MR. CARTER: Yes.

2 THE WITNESS: If you look at Table 1 on the
3 left-hand side, you can see that the springs that we
4 sampled in the mine inflow locations as well, and the
5 dates that we sampled. Some of them were sampled twice.
6 We collected both major ions, cations and we also
7 collected isotopic data from these locations.

8 Q BY MR. APPEL: Okay. One of your studies
9 was a -- was chemical in nature; correct?

10 A Yes.

11 Q Could you tell us about that?

12 A We analyzed for major anions, cations at
13 these locations. Let's see, let me describe the
14 locations.

15 Q Do you need to do that on a map?

16 A I can do that on this map, just so we can
17 get a reference point here. If you look at the left-hand
18 side of Table 1, we know Big Bear Spring is located
19 directly downgrade of the mine; so is Birch Springs.
20 Little Bear Spring is located northwest on the other side
21 of the canyon. It also discharges out of the Star Point
22 sandstone.

23 We collected water from the lower Tie Fork
24 Spring which was developed by Castle Valley Special
25 Services. It's located along the Pleasant Valley fault.

1 It discharges out of the Star Point sandstone. We also
2 collected water from the upper Tie Fork as well. It
3 discharges along the northern extension of the Trail
4 Canyon fault.

5 We collected water samples from two springs
6 on the east side of the Pleasant Valley fault zone. They
7 discharge out of the North Horn formation right along the
8 fault, McCadden No. 2 and McCadden No. 1, with McCadden 2
9 being north.

10 We also collected a sample from Bear Canyon
11 Spring which is located in the northern part of Bear
12 Canyon on the east side of the fault coming out of the
13 North Horn formation by the slumping area on top of the
14 canyon.

15 Plus we collected inflows from various
16 locations inside the mine coming out of the roof or out
17 of borings that they've drilled into the Black Hawk
18 formation.

19 Q Okay. Have you represented your collection
20 of that data anywhere?

21 A Yeah. We have the information from the
22 periods that we collected in Table 1, both the major
23 cations, anions, field parameters and the isotopic
24 information. We've also plotted it as a Piper diagram on
25 the first page, and as Stiff diagrams on the second page.

1 MR. SMITH: And this is Exhibit 4 we're
2 referring to. Is that --

3 THE WITNESS: Yes, Exhibit 4.

4 Q BY MR. APPEL: And what do those diagrams
5 show you?

6 A It shows a pretty tight clustering of water
7 with slight variations, which probably represents mixing
8 between two different types of water. We've got one
9 sample that's out in the middle. You'll notice it's
10 DH-1, collected on 3-5-92. It has a large imbalance of
11 bicarbonates so it probably represents an analytical
12 error or something like that. It may not be
13 representative. But if you look at it, it's a calcium
14 bicarbonate sulfate water.

15 Q Okay. And on page 2 of Exhibit 4, you have
16 some -- I'll just call them polygons. What do those
17 represent?

18 A These are Stiff diagrams in milli
19 equivalents per liter. It's not milligrams per liter but
20 an equivalent per liter value. The shape of the Stiff
21 diagram sort of tells you what kind of water it is and is
22 used for comparison.

23 Q So it shows similarities between water in
24 certain locations?

25 A Yes, and shows similarities.

1 Q Whether or not it's the same water or not?

2 A Uh-huh. Or same type of water.

3 Q Type of water. When you say "type of
4 water," what do you mean?

5 A Meaning what we've called it, a calcium
6 bicarbonate sulfate or calcium magnesium water.

7 Q Would it be fair to draw the conclusion that
8 Stiff diagrams of roughly the same shape are water that
9 originated from the same place?

10 A I don't know if you can say the same place,
11 but have gone through the same geologic conditions.

12 Q Okay. Go ahead.

13 A If you look at the Stiff diagrams, you'll
14 notice some minor changes, differences in pattern, most
15 notably being DH-1, third from the bottom. You can see
16 that the patterns are nearly the same with minor changes
17 in the amount of calcium or the amount of sodium that's
18 in here.

19 For instance, if you look at Third West
20 South which is the fourth from the bottom, you notice
21 that you have more magnesium than calcium, but you also
22 have increased sodium plus potassium and chlorides. This
23 suggests that you may have an ion exchange going on in a
24 shale whereas you substitute sodium for calcium.

25 But generally if you look at the Stiff

1 diagrams, the shapes are fairly consistent among springs
2 and among the water flowing into the mine, SBC-9-S, Third
3 West, Third West Bleeder, lower Tie Fork, upper Tie Fork,
4 Birch, Big Bear, all show similar Stiff diagrams:
5 Calcium, magnesium, bicarbonate water with various
6 amounts of sulphur in it or sulfate.

7 Q Have these Stiff diagrams been in place on a
8 larger map?

9 A They've been -- I placed it on -- I think
10 it's Exhibit 2, a larger map.

11 Q Which would show the sources where they
12 actually are?

13 A It shows the distribution physically of
14 where these samples were collected and the Stiff diagram
15 representatives of that water.

16 Q So what is your conclusion based upon your
17 chemical analysis of this water?

18 A My conclusion is that if you look at the two
19 springs that we sampled out -- or the three springs that
20 we sampled out of the North Horn formation, McCadden 1, 2
21 and Bear Canyon, they show that most of the water by that
22 time has picked up calcium magnesium. The North Horn
23 formation has limestone beds in it. It has calcium
24 in -- it's a carbonation unit with limestone. You've
25 picked up most of the cations by that point. The stuff

1 flows into the lower Black Hawk which is predominantly
2 sand and some shales, which has probably a lower
3 potential for dissolving solids into. So I think most of
4 the stuff is being picked up in the North Horn formation
5 and then flows vertically into the Star Point sandstone,
6 lower Black Hawk. Some of these are encountering some
7 shale beds. We're getting ion exchange occurring.

8 Q Would you expect that?

9 A Yeah, for that geologic circumstances where
10 you have a perched aquifer with limestones in it
11 overlaying a relatively predominant sandstone unit with
12 shales, this is what you'd expect, calcium bicarbonate
13 water.

14 Q So this water has generally followed the
15 same path?

16 A Yes.

17 Q And what is that path?

18 A The path is that it recharges into the North
19 Horn formation and then moves vertically downward through
20 the Black Hawk formation, with vertical fractures, and
21 recharges the Star Point sandstone. To me it shows that
22 the water is recharged through the same sort of pathway.

23 Q So the water from inside the mine followed
24 that pathway?

25 A Yes.

1 Q And the water from Birch Springs followed
2 that pathway?

3 A Yes.

4 Q And the water from Bear Canyon Spring
5 followed that?

6 A Yes.

7 Q Big Bear Springs, sorry.

8 A Yeah.

9 Q Followed that pathway?

10 A Yes.

11 Q And the water from all of your spring
12 samples?

13 A Yeah.

14 Q Followed that pathway?

15 A Yeah. With minor changes in the calcium and
16 sodium. And it should be noted that these come from both
17 north of the mine and south of the mine and east and
18 west. This suggests that the area, there's no difference
19 in recharge between north and south. It's recharging
20 through the same mechanism.

21 Q And the source of that water is where?
22 Where does it come from?

23 A Oh, I had to think for a minute what you
24 meant. It would be from snowmelt up on Gentry Mountain,
25 Gentry Ridge, that whole area.

1 Q Okay. Does that conclusion bolster your
2 interpretation of the area geology?

3 A Yes.

4 Q You also performed what is referred to as
5 isotopic analysis; is that right?

6 A Yes.

7 MR. CARTER: Jeff, can I ask a question on
8 the Stiff diagram?

9 THE WITNESS: Yes.

10 MR. CARTER: Because a little knowledge is a
11 dangerous thing.

12 Would residence -- I understand your
13 testimony to be that the water chemistry is determined by
14 what it's been in contact with?

15 THE WITNESS: Yes.

16 MR. CARTER: Which makes perfect sense.
17 Would residence time in contact with things change the
18 chemistry in ways that you could detect from the Stiff
19 diagram?

20 And my second question is in looking at
21 these Stiff diagrams, do you see any distinction between
22 water that's been in contact with basically lime units
23 for a longer time than others or water that has been --
24 obviously sodium is characteristic of the shales, but
25 setting that aside for a minute --

1 THE WITNESS: Yeah.

2 MR. CARTER: -- can you draw any other
3 conclusions about residence time from the Stiff
4 diagrams?

5 THE WITNESS: Typically if you have a longer
6 residence time you increase the total concentration of
7 what's in the water?

8 MR. CARTER: So these would just be longer?

9 THE WITNESS: So your TDS increases or your
10 amount, your amount of ions and anions increases as the
11 flow path is longer. Some of these ones, for instance,
12 like Third West South, Birch, can show possibly a longer
13 residence time, because they do have typically higher
14 concentrations of all these constituents.

15 MR. CARTER: Okay.

16 THE WITNESS: Suggesting they've been in
17 contact longer and dissolved more of the material.

18 MR. CARTER: And if I may, can I allow them
19 to ask questions if they've got them specifically?

20 THE WITNESS: Did I answer both?

21 MR. CARTER: I think you did. I mean that's
22 what I was after.

23 MR. APPEL: Could I ask a follow-up on
24 yours?

25 MR. CARTER: Sure.

1 Q BY MR. APPEL: Does this also bolster the
2 conclusion that the perched aquifers are really an
3 integral part of this system?

4 A Yeah. I think it shows most of the water
5 recharges through the North Horn which is found almost
6 entirely on the Gentry Mountain except on the steep
7 slopes above the mine, north of the mine, east-west of
8 the mine.

9 Q And some of this residence time in change
10 and chemistry could have occurred because the water has
11 perched for a period of time?

12 A Perched for a period of time or was flown a
13 long distance through a fault or a bed. Yes.

14 Q That seemed to be a logical extension of
15 what you were asking.

16 MR. CARTER: Right. Thanks. Questions on
17 the Stiff diagram?

18 MR. MAYO: I have a couple questions.

19
20 FURTHER EXAMINATION

21 BY MR. MAYO:

22 Q Is SBC-9-S, is that a roof drip?

23 A That's a roof draw. Comes out of a
24 prominent fracture in the north part of the mine.

25 Q And is Third West B, is that well water in

1 the bottom of the mine?

2 A No. It comes out of a vertically upward
3 boring from the coal seam towards the west, up into the
4 lower Black Hawk.

5 Q So those are both waters that are in the
6 roof?

7 A Yes.

8 Q Above the coal?

9 A Yes.

10 Q How do you account for the difference, such
11 a fundamental difference in the chemistry between the
12 two?

13 A Between Third West South and SBC-9?

14 Q Yes.

15 A I think, if I recall, Third West South was a
16 boring or a set of borings that was drilled a couple
17 hundred feet upwards west towards the fault zone, and it
18 could be that this water has intercepted flows associated
19 with the fault zone on the west side over here. They
20 were drilled in the western direction towards these fault
21 zones over here.

22 So I think it's possible that they've
23 intercepted water that's flowed longer associated with
24 fracturing along the fault versus stuff that's coming out
25 of the sandstones in the Black Hawk formation.

1 Q I have a question regarding residence time
2 and increased TDS.

3 Is thermodynamics instantaneous?

4 A No, thermodynamics is not instantaneous.
5 That's the driving mechanism for the stuff to dissolve.
6 You have to consider kinetics.

7 Q What kinetic factors do you think would
8 cause the increase, such differences in TDS as a function
9 of time in this system?

10 A It could be introduction of more sulfate
11 into the system. It could be an introduction of
12 different sources from sulfate, additional calcium, or
13 CO₂ gas may even drive it if it was an open system.

14 Q Did you calculate saturation into the
15 indices?

16 A Yeah. Most of these waters are saturated,
17 slightly oversaturated with calcium magnesium,
18 undersaturated with sulfates, gypsum, and anhydrites.
19 Most of the carbonate minerals are saturated in this
20 area.

21 Q Did you attempt to do an analysis such as a
22 Net Path analysis on those to try to understand it?

23 A Yes.

24 Q And what results did you get?

25 A I was able to take water that I would call

1 soil zone recharge, took it through a system that I would
2 consider saturation with calcium magnesium and limestone,
3 and then took a discharge out through both Big Bear and
4 Little Bear. Not Little Bear. Birch.

5 So with Net Path we were able to show that
6 based on parameters of what we could call recharge in the
7 soil zones, with CO₂ gas going into a limestone system,
8 maybe encountering gypsum along the way, and then coming
9 out as a carbonate calcium magnesium water.

10 Q When did it change in the system?

11 A When it intercepted the North Horn
12 formation, dissolved calcium into the limestone.

13 Q So basically once the water recharged, the
14 chemistry of the water was set?

15 A Basically. North Horn is -- I think looking
16 at this, North Horn is the controlling factor for the
17 chemistries of these waters, I think.

18 Q And did you in the Net Path calculation
19 bring in sulfa 34 and carbon 13?

20 A Yes, we did. We introduced those as
21 constraints.

22 Q Are you going to present those analyses?

23 A Are we?

24 MR. SMITH: Yeah.

25 THE WITNESS: Yeah. I think I have them, I

1 hope.

2 MR. CARTER: So the answer's yes?

3 MR. SMITH: Yes, the answer's yes.

4 THE WITNESS: Maybe, yes.

5 MR. CARTER: All right.

6 MR. MAYO: I'd like to get back to this
7 Third West B for a moment again.

8 Q How did your Net Path analysis deal with
9 Third West B? How did it differ from the other
10 chemistries?

11 A Let's see. Right offhand --

12 Q I'm sorry, not Third West B.

13 MR. CARTER: Third West South.

14 MR. MAYO: Yeah.

15 Q I've been talking about -- let's say -- the
16 one I'm really interested in, is that D?

17 A The label's below the Stiff diagram.

18 Q The label's below it?

19 A Yes.

20 Q So I think it's DH-1.

21 A Mm-hmm.

22 Q Is that a well?

23 A That's a well screened into the Spring
24 Canyon sandstone.

25 Q How do you account for the difference

1 between this Third West S and the Third West B? One's a
2 roof drip and one's a well or over --

3 A No, both of those are out of borings in the
4 Black Hawk formation above the Blind Canyon seam.

5 Q Okay. Borings toward the fault on the
6 west. I may have confused you.

7 A I confuse myself.

8 Q Third West South is a roof drip; is that
9 correct?

10 A No.

11 Q Or boring in the ceiling?

12 A Third West South consists of borings towards
13 the fault.

14 Q But they're in the ceiling going up?

15 A Actually I think they're drilled into a full
16 rock face. They intercept at a fault drilled upwards at
17 an angle. I'm not sure what the angle was. A couple
18 hundred feet.

19 Q Okay. Let me try this another way. DH-1 is
20 a well in the Star Point sandstone?

21 A In the Star Point sandstone.

22 Q And the solute chemistry of this well, this
23 water is substantially different than the solute
24 chemistry of waters coming out of the roof of the mine;
25 is that correct?

1 A Yes.

2 Q How do you account for that?

3 A I think it lacks bicarbonate either from a
4 chemical error or an analytical. It's so distinctly
5 different, I think it's analytical error in that.

6 Q If that water discharged in the North Horn
7 as all the other water did --

8 A It did.

9 Q -- didn't it have the same chemistry?

10 A It should and it would if it had more
11 bicarbonate. What I'm saying, I think the water is fine,
12 but I think the water sample for DH-1 out of the Co-op
13 permit has an error in the bicarbonate number. Because
14 if you look at the ratio of sodium calcium magnesium,
15 it's similar to all the others, even though this one does
16 have more sodium. Sulfate's increased. The only thing
17 that's really different is the bicarbonate.

18 Q What was the analytical error on this? Do
19 you recall?

20 A I don't recall.

21 Q Because of the --

22 A I can't even remember exactly right offhand
23 what the bicarbonate number was on it.

24 Q If we were to make the side of -- the
25 right-hand side of this diagram, in other words, increase

1 the bicarbonate, would that make this water look like the
2 other waters?

3 A I think it would, factoring in the fact that
4 you've got some ion exchange going on with increased
5 sodium. No, this well's still open. Right offhand I
6 can't recall when this water sample -- well, it was
7 collected 5-92, and I don't know exactly what that date
8 corresponds, if that was directly after this well was
9 installed or not. I'm trying to think. The possibly --
10 possibly I had also thought that maybe that represents
11 some problems with construction of the well or something
12 like that.

13 Q I think that's all I can do with this right
14 now.

15 MR. CARTER: Okay. Anything else in the
16 Stiff diagrams? All right. Let's move on.

17

18 FURTHER EXAMINATION

19 BY MR. APPEL:

20 Q Tell us about your findings on isotopic.

21 A Which one do you want to start with?

22 Q Your selection.

23 A Let's starts with tritium.

24 Q Now before we do that, have you reviewed
25 Co-op's findings or Earth Facts' findings with respect to

1 tritium?

2 A Yes.

3 Q Okay. Go ahead.

4 A Tritium concentrations are shown on the
5 right-hand side there with a $_3\text{H}$ designation on Table 1.
6 You can see that we've got a various range of tritium
7 values through here.

8 MR. SMITH: I hate to interrupt, Peter, but
9 could you explain what steps you went through to do the
10 tritium analysis? I mean did you take new samples or --

11 THE WITNESS: Yes.

12 MR. SMITH: -- what did you do that basis
13 on?

14 THE WITNESS: We collected these in glass
15 amber bottles that were filled with argon to prevent
16 atmospheric contamination. We collected these, sealed
17 the bottles and sent them to the University of Miami
18 tritium lab for analysis on these. You can see we've got
19 quite a range of tritium values both in the mine and on
20 springs discharging at various locations around the mine.

21 Q BY MR. APPEL: And you're referring to Table
22 1?

23 A Table 1, yes. Tritium is produced in the
24 atmosphere at a fairly constant rate. That rate has been
25 estimated to range anywhere from 3 to 20 tritium units.

1 And if you look at a natural decay of a range 36 to 20
2 tritium units using a decay of 12.26 years, if you had
3 natural water recharging the system and decaying over a
4 period of time, anything more or less would indicate a
5 prebomb water; by that definition meaning anything before
6 1945 is called prebomb.

7 Anything is after prebomb, meaning that
8 nuclear testing injected tritium into the atmosphere at
9 several orders of magnitude above the natural tritium
10 production rate.

11 So anything with a 4 or less you would
12 assume to be a prebomb water; anything greater than that
13 would have some component of modern recharge.

14 So we look at values in the table. If you
15 look at the Bear Canyon inflow samples at the bottom of
16 the mine, or at the bottom of the table, you see they
17 range from the statistically zero to 2.2 tritium units,
18 indicating prebomb water. The same is also true for
19 Birch Springs located toward the top of the table, 0.73.

20 The others, for instance, McCadden 1, 2, and
21 Bear Canyon Spring located towards the bottom center part
22 of the table ranges from 19 to 36. Those suggest some
23 component of modern water and older water. The Bear
24 Canyon Spring sample, 36.7, may represent more of a
25 current atmospheric recharge value.

1 The others, lower Tie Fork at 9.6, upper Tie
2 Fork at 10.1, Little Bear Spring of 22, and Big Bear
3 Spring suggests the conclusion that there is some
4 component of mixing between modern water and older
5 water.

6 Basically I think that's the only conclusion
7 you can come to. There's some component. What that
8 component is we don't know because you don't know exactly
9 where you're starting from. But it does suggest some
10 mixing of old and new water.

11 Q Where does the old water come from?

12 A I think the old water would come from the
13 regional aquifer.

14 Q Where does the new water come from?

15 A From modern recharge.

16 Q Okay.

17 A Annual recharge on a yearly basis.

18 Q Is that consistent with the flows you see
19 from Birch Springs and Big Bear Spring?

20 A Yes.

21 Q How so?

22 A If you look at the flow data charts, we also
23 have those included in here. In particular look at
24 chart -- look at the very last plate, 7, I have the
25 faint dash line is annual precipitation, and the three

1 dash lines represent flow at Big Bear Spring, which is
2 the middle one; Birch Springs, which is the lower one;
3 and Little Bear Spring, which is the top flow pattern.

4 You can see with the exception of Birch that
5 Little Bear and Big Bear have significant components of
6 annual recharge shown by the yearly peaks with components
7 of base flow recession which are especially obvious
8 during periods of lower precipitation.

9 So the tritium showing a component of modern
10 and older water is also substantiated by the fact that
11 you've got annual recharge injection into the groundwater
12 system with some sort of base flow groundwater system.

13 Q So the tritium value isn't high enough to be
14 all new water and isn't low enough to be old water?

15 A Not in my opinion, no.

16 Q Okay. All right. You've mentioned Little
17 Bear Spring. Why is that important to this analysis?

18 A Little Bear Spring is located northwest of
19 this area and discharges in a similar hydrogeologic
20 environment as Birch and Big Bear Springs, lower Tie Fork
21 and upper Tie Fork. It discharges from the Panther
22 sandstone member. It has a normal fault associated with
23 it and is in our opinion not influenced currently by
24 mining.

25 Q Have you used it as a control in this

1 particular --

2 A We've used it as a control in this instance
3 here. The other thing to note about Little Bear Spring
4 and the rest of the springs is the geology between the
5 two is very similar. Huntington Canyon does not
6 represent a structural barrier or a structural difference
7 between geologic formations on the east and west side of
8 the canyons. They're very similar, same depths, same
9 formations, same lithologies. The only difference is
10 that the recharge area for Little Bear Spring is probably
11 a little further west than the recharge area for the
12 other springs in this study.

13 MR. SMITH: Okay. And you -- sorry. I was
14 just going to say, so you're comfortable using that as
15 a -- Little Bear as a control?

16 THE WITNESS: Yes. Yes. The only major
17 difference is probably the further west recharge area.
18 However, the elevations of the recharge areas are fairly
19 similar.

20 MR. CARTER: Let me ask a couple questions
21 here.

22 THE WITNESS: Okay.

23 MR. CARTER: Again, a little knowledge is a
24 dangerous thing. The shape of the precipitation curve
25 and the shape of the Birch Spring curve are very

1 similar. In other words, the peaks are real sharp, which
2 would suggest to me that there's more direct recharge
3 like along fractures systems rather than the shape of the
4 Big Bear Spring curve and the shape of the precipitation
5 curve, which -- the word I'd use --

6 THE WITNESS: You mean the top curve? The
7 top curve there is Little Bear Spring.

8 MR. CARTER: Is the top of curve Birch or
9 Little Bear?

10 THE WITNESS: Little Bear. Write that on
11 your graphs. The top one is Little Bear. The middle one
12 is Big Bear, and the bottom one is Birch.

13 MR. CARTER: Where I was headed was that the
14 curve for Big Bear is smoother. It's more rounded. And
15 I mean I just, the concept that suggests to me is that
16 that looks like sort of the moderated buffered reaction
17 of a large regional aquifer to precipitation with some
18 delay of 6, 8, 9 months.

19 THE WITNESS: Which point of the curve? The
20 whole point of the curve, or the last?

21 MR. CARTER: I'm just looking at typical
22 highs and typical lows and marking it with other highs
23 and lows in precipitation, whereas Little Bear, for
24 example, looks much more directly connected to the
25 precipitation events in terms of its shape. And I didn't

1 know if that was a fair conclusion to derive. I don't
2 know what the vertical saturation is.

3 THE WITNESS: I think so. However, if you
4 look at the first part of the flow data curves here for
5 Little Bear and Big Bear that span water years 1982 to
6 86, the discharge pattern is fairly similar. You've got
7 fairly steep peaks representing annual recharge that have
8 only one to two months duration back down to baseline
9 flows.

10 And the other thing to notice that
11 following, following say 1992, so the '93 water here,
12 Little Bear has recovered to a pattern similar to the top
13 part. Yes. Yeah. So you've got a recovery of Little
14 Bear to say pre-1987 flows, whereas Big Bear has a muted
15 effect to pre-1987. And if you look at the difference
16 following 1986, that's when mining was starting to
17 intercept above Big Bear Spring.

18 MR. CARTER: Okay.

19 MR. MAYO: We have a few questions when it's
20 our time.

21 MR. CARTER: Birch Springs is nice and flat,
22 and if you couple that nice flat curve with the
23 predominantly older water, that would buttress your
24 conclusion that it's mostly influenced --

25 THE WITNESS: Yeah. There are some small

1 minor peaks, and if you look at that data closer, those
2 peaks typically occur at the same time, anywhere from
3 July to October, mostly in October, some of them. But
4 that suggests to me that there is a small recharge
5 occurring annually. But it's moderated by I think the
6 large recharge area for Birch.

7 MR. CARTER: Okay. Thanks. Co-op table.

8 MR. MAYO: Peter, we have a few questions.

9
10 FURTHER EXAMINATION

11 BY MR. MAYO:

12 Q Okay. On the tritium, first we look at the
13 location of Big Bear Spring on Exhibit 5. If we're to
14 draw a flow line along these equipotential lines, it's
15 pretty much right in the middle of or maybe off a little
16 to the east, but it's directly downgradient along the
17 equipotential line; is that correct?

18 A Yes.

19 Q And yet, and this water is -- you believe
20 this water is discharging out of the Star Point
21 sandstone. It's discharging because it's part of the
22 regional aquifer in the Star Point sandstone?

23 A Yes, yes.

24 Q And the waters inside of the mine have
25 tritium values which you would designate as being

1 preatmospheric testing from the nuclear weapons?

2 A Yes, yes.

3 Q And we look at the tritium content of the
4 water in Big Bear Spring, and it's 5.8 TU's and that's
5 really a modern tritium number?

6 A Yes, it is. But I think it represents a
7 component of modern, not necessarily a modern.

8 Q How much of a component of modern?

9 A I have no idea. There's no baseline
10 atmospheric tritium value in this area.

11 Q Do you think it's 50 percent modern?

12 A I think the Bear Canyon Spring sample of 36
13 is probably representative of that, of a modern recharge.

14 Q Okay. Because we've got McCadden Spring,
15 Big Canyon Spring, and these things are looking at
16 tritiums anywhere from 20 to 36?

17 A Yes.

18 Q Okay. So if we were to take a half life of
19 the 36.7 years, and half life would be 6 years, and we
20 could be down to 15 TU's in six years; is that correct?

21 A Half life is 12 years.

22 Q Oh, I'm sorry. We could be down there in 12
23 years.

24 A 12 years.

25 Q Thank you.

1 A You decrease that in half in 12 years.

2 Q So this water could just be 12 years old --

3 A The water --

4 Q -- out of Big Bear Springs?

5 A It could be, yes. But it also could be

6 mixed from an older water of 36 and a younger water of

7 zero, or some other mixture component.

8 Q If we did that kind of mixing, then the

9 younger component would be even younger than 12 years,

10 wouldn't it?

11 A Yes.

12 Q And we haven't talked about carbon 14, so

13 I'll let you tell your story before we get into that.

14 So this one clearly has a major component of

15 modern water?

16 A Yes.

17 Q Which -- would you give that major

18 component of modern water having recharges up here on

19 Gentry Mountain, working its way down North Horn, Price

20 River, Black Hawk, running into the Star Point sandstone;

21 then moving horizontally through the Star Point sandstone

22 for whatever distance, this section over, and then

23 discharging out with a large component of modern water?

24 A Not if it's recharging up in the so-called

25 shatter zone. No. I think that whole area has to be

1 recharged again.

2 Q Okay.

3 A McCadden Hollow, points above the mine, the
4 whole area.

5 Q I don't want to put words in your mouth, but
6 we need another recharge source for Big Bear Spring in
7 addition to the regional aquifer.

8 A I'm not sure I follow that.

9 Q Okay. Inside the mine we have waters and
10 all the waters inside the mine are preatmospheric testing
11 for nuclear weapons?

12 A Yes.

13 Q That water, you've already testified that
14 you believe that that water is part of this regional
15 aquifer system that includes both the lower portion of
16 the Black Hawk sandstone and the Star Point sandstone?

17 A Perched.

18 Q And this is one large aquifer, and this
19 aquifer system recharges from the North Horn and it's all
20 part of one really large system and the waters inside of
21 the mine are -- have some age to them. We're not quite
22 sure what the age is?

23 A Right.

24 Q And the water discharging out of the Big
25 Bear Spring, which is directly downgradient along the

1 equipotential lines, has a fairly substantial component
2 of modern recharge?

3 A It could have a fairly substantial, but we
4 don't know what that is. But you've also got to look at
5 the fact we've got Birch Springs which is downgradient
6 from -- not directly -- but it's downgradient, and it
7 also has no component of modern.

8 Q Right. I know. We're also talking about
9 Big Bear Spring.

10 A I am too.

11 MR. CARTER: Let me ask one clarifying
12 question. Birch is west of the fault?

13 THE WITNESS: Southwest. No, no. It's
14 right on the fault.

15 MR. CARTER: It's on the fault.

16 MR. MAYO: On a fault.

17 THE WITNESS: A fault in there, yeah. One
18 of numerous faults.

19 Q BY MR. MAYO: So the one spring that we have
20 that had bounded between the two faults that are of great
21 concern here, and the regional aquifer system that we
22 have that's bounded between those two faults is
23 discharging. The big discharge we have there is Big Bear
24 Spring, and that spring is loaded with tritium?

25 A Yeah, at 15. But I don't see how you can

1 conclude how modern that is when we don't know where we
2 started from modern.

3 Q Well, I'm just trying to understand the
4 hydrologic model you put together.

5 A Yeah. The Big Bear Spring has to be a
6 two-component spring. You've got a modern part and
7 you've got a baseline part. That's the object. Way it
8 works you look at the flow path and the tritium numbers.

9 MR. CARTER: Let me ask a question. Isn't
10 it possible that by the time it takes a molecule of water
11 in the atmosphere with 36.7 tritium to reach Big Bear
12 Spring through that tortuous path could be on the order
13 of 12 years, half the life?

14 THE WITNESS: On the order. On the order.

15 MR. CARTER: Okay. Thanks.

16 THE WITNESS: On the order.

17 Q BY MR. MAYO: And if that's the case then,
18 I'm just wondering how we get waters inside of the mine
19 which are also in this flow path that have anywhere from
20 0 to 2.2. I'm just trying to figure out how this whole
21 picture fits together, and I'm trying to understand is
22 there another recharge source of some substance to Big
23 Bear Spring in addition to any water which may or may not
24 be flowing, which the mine may or may not intercept?

25 A Well, the two, the two recharge points for

1 Big Bear Spring is any system upgradient in the lower
2 Black Hawk and the Star Point sandstone plus the annual
3 recharge that occurs on top of Gentry Mountain, not north
4 of the mine, but north of the mine and above the mine in
5 that whole area.

6 Q But that water would flow through any water
7 that's recharging up on Gentry Mountain to get to Big
8 Bear Spring; then it would flow through this regional,
9 this system that you've designated as a regional system
10 which you've identified as having 2.2 TU's or less in the
11 vicinity of the mine area, and Big Bear Spring discharges
12 just right downgradient of the mine area.

13 A Exactly.

14 Q Okay. So what I'm getting at --

15 MR. APPEL: Are you asking a question or are
16 you testifying?

17 MR. SMITH: I'm starting to wonder.

18 MR. APPEL: You'll get your chance.

19 MR. SMITH: Excuse me, can I finish
20 before --

21 MR. CARTER: Let me. Mr. Smith, go ahead.

22 MR. SMITH: Yeah. I think we're getting to
23 where these aren't questions, these are statements. I'm
24 sure they'll have an opportunity to put Mr. Mayo under
25 oath or Dr. Mayo or whatever his proper title is.

1 MR. MAYO: It's Dr. Mayo.

2 MR. SMITH: Dr. Mayo under oath, and then he
3 can testify under oath. But I think it's improper for --
4 it's either argument or testimony. If he has questions,
5 that's fine. We're getting beyond questions. If he has
6 questions. I think we'll have a much better presentation
7 if we limit his participation to questions right now, and
8 I would ask the director to do that.

9 MR. M. HANSEN: If I may comment briefly.

10 MR. CARTER: Sure.

11 MR. M. HANSEN: I was listening to
12 Dr. Mayo's question, and I would submit that it is a
13 question trying to clarify what Mr. Nielsen's testimony
14 was to find out if this was the set of facts that he was
15 saying; that it was a question pure and simple. He was
16 trying to inquire into the clarification of the facts
17 that Mr. Nielsen was testifying to and nothing more.

18 MR. CARTER: Let me -- before I decide what
19 we're going to do here precisely, let me tell you that I
20 am going to try to balance informal so that we can have a
21 discussion and question and answer. But I think we'll
22 have to maintain some level of formality, if for no one
23 else the reporter, so that it doesn't become a complete
24 free-for-all and we have a clear record.

25 But I'm going to let Dr. Mayo pose a

1 question, and I think I knew where that was going, but
2 there were lots of caveats attached to it. So if he has
3 a question with regard to the overall system, let him ask
4 that.

5 MR. M. HANSEN: I would agree with the
6 concerns that Mr. Appel and Mr. Smith made that the
7 question should be questions and they should not be
8 rebuttal testimony in the guise of questions. And so I
9 would suggest to anyone on quote "Mine's" side to keep
10 that in mind.

11 MR. CARTER: Thank you.

12 MR. APPEL: Thank you, Mr. Hansen. We'll
13 try to bestow the same courtesy on you.

14 MR. M. HANSEN: Thank you.

15 MR. MAYO: I'll try to make this question
16 very short.

17 Q Is there more than one source of recharge
18 water for Big Bear Spring?

19 A There's more than one source, yes.

20 Q And do you know what that second source is?

21 A No, I don't. I think the only thing that
22 can be said using the tritium data, because we don't have
23 starting points, is that there's some component of modern
24 and old water. If I tack the 2.2 values or less in the
25 mine and mix it with the 36, to some degree I still come

1 up with 15. That's your two component of recharge. I
2 can also do -- based on flow rates I can take a 70/30
3 mixture and come up with this.

4 MR. CARTER: I understand.

5 THE WITNESS: The only thing that can be
6 said conclusively is that you've got some component
7 here. What that component is here, I don't know.

8 MR. CARTER: Let me see if I can clarify my
9 own understanding. So there are several alternative
10 scenarios that would produce these numbers.

11 THE WITNESS: Exactly.

12 MR. CARTER: One being two sources, one
13 being aging of a single source.

14 THE WITNESS: Unless you know your start
15 point, I don't see how you can pin that down at all. Now
16 it should be noted also that the SBC -- the Third West
17 South and the Third West bleeders come from the area of
18 the Trail Canyon fault, which is near Birch Springs,
19 whereas the SBC-9 source is a roof fracture. So I think
20 the water, you know, I can't remember exactly how deep
21 those borings were. You'd have to ask Co-op. But I
22 think they're on the order of several, a couple hundred
23 feet I think or somewhere in that area west of the mine.

24 MR. CARTER: Would this be an appropriate
25 point for a break?

1 MR. SMITH: I have a couple follow-up
2 questions, and then I think we would be at that point.
3 Assuming they're concluded.

4 MR. APPEL: No, Dr. Mayo has another
5 question.

6 Q BY MR. MAYO: On Birch Spring, is Birch
7 Spring associated with one of the bounding faults?

8 A It is not the bounding fault on the Pleasant
9 Valley fault system but associated with the Trail Canyon
10 fault, which is a large continuous fault system, yes.

11 Q Is Birch Spring located inside or outside of
12 the area that you've drawn equipotential lines for?

13 A It is located inside right there. Birch
14 Springs would be located almost due west of Big Bear up
15 slightly, kind of north of it and the last part of
16 Huntington Canyon. That's where Birch would be located.

17 Q And you had no data control for drawing the
18 7300 foot contour line in the vicinity of Birch Spring;
19 is that correct?

20 A I used Birch Springs in one of my contouring
21 and it shifted the groundwater flow contours toward the
22 southwest.

23 Q Okay. Does Birch Spring issue from the
24 fault?

25 A Yes. It comes right at the fault zone.

1 Q So it's a fault-related water?

2 A Fault-related water.

3 Q And it's .73?

4 A .73, yes.

5 MR. SMITH: I have just a couple follow-up
6 questions on Birch Spring. So Birch Spring, unlike Big
7 Bear Spring, would only have one source based on the
8 tritium analysis, one source of --

9 THE WITNESS: It has prebomb water, yes.

10 MR. SMITH: And that, in the tritium
11 analysis, that's exactly the same source as the water
12 you've encountered in the mine?

13 THE WITNESS: Yes.

14 MR. SMITH: So your conclusion would be
15 Birch Spring and the mine water come from the same
16 source?

17 THE WITNESS: If you look at tritium
18 numbers, they're both prebomb waters, yes.

19 MR. SMITH: That's all I have.

20 MR. C. HANSEN: I've got three or four quick
21 questions that really don't need discussion, just
22 answers.

23 MR. CARTER: All right.

24 /////

25 /////

EXAMINATION

BY MR. C. HANSEN:

Q The precipitation that you have on your graph, did you use this from what station?

A I used the Mammoth, Cottonwood, Red Pine Ridge, Hiawatha, East Mountain, Stewart's Ranger Station and Huntington Power Plant.

Q Okay. In Brown's report you mention the shatter zone?

A Yes.

Q Do you know where he got that idea that there is a shatter zone there?

A He mentions one sentence about a shattered zone. I have no idea where it came from.

Q I was just curious because I've never seen it.

A Yeah. I tried to find that too. But I also know it shows up, in fact it may show up on this map, since it's his.

Q The Joe's Valley?

A Yeah. He's got shattered zones there but he's also got shattered zones here.

Q But he doesn't give any base?

A He doesn't define shatter zone.

Q Then you're saying Little Bear Spring is the

1 control point?

2 A It's our control point for groundwater flow
3 from the regional system in this area right here.

4 Q And you say it's located along the fault?

5 A Yes. That spring, there's a normal fault
6 there with something like 10 to 20 feet of displacement.

7 Q But it's not a graben system?

8 A No, not a graben system.

9 Q And you said it was not influenced by mining
10 activities?

11 A In this -- in the immediate basin area
12 right here, the Crandall Canyon Mine is located north of
13 it, and I believe there was some smaller workings in --
14 let's see, that's Mill Fork Canyon, I believe, in here.

15 Q But the --

16 A There's no significant northward movement.

17 Q But in here --

18 A Some of those older. Yeah.

19 Q And they did mine that ridge, though?

20 A Yeah. They entered in from here, and I
21 don't know how far north they were actually located, but
22 they did mine this area and they mined this area.

23 Q So they mined the ridge that's directly
24 south?

25 A Directly south. Once again I don't know how

1 far north they've gone on those.

2 Q Thanks.

3 MR. M. HANSEN: I have a couple brief
4 questions, if I may.

5 MR. CARTER: All right.

6 MR. M. HANSEN: They are brief.

7

8 EXAMINATION

9 BY MR. M. HANSEN:

10 Q Now you agree, don't you, that between the
11 coal seams that are being worked by the mine and the
12 sandstone member from which the springs emanate, there
13 are two layers of shale separated by sandstone. You
14 agree those layers are there?

15 A Now you mean in the Black Hawk or in the
16 Star Point?

17 Q I mean between.

18 A Between the coal seams would be
19 predominantly sandstone.

20 Q Below the coal seams.

21 A Yeah.

22 Q There's a layer of shale and a layer of
23 sandstone?

24 A Yes. Between the individual members of the
25 Star Point there are shales.

1 Q So your assumption that Big Bear has a mixed
2 component of modern water and old water, in that the old
3 water component comes from this same area as the water
4 encountered in the mine assumes that the water that we
5 are encountering in the mine passes through those shale
6 members; is that right?

7 A Through the vertical fractures, yes.

8 Q So your model assumes that there are
9 vertical fractures?

10 A Mm-hmm.

11 Q That keep those shale members open?

12 A Yes. My model assumes that; Line's model on
13 East Mountain assumes that; Danielson's model assumes
14 that; Waddell assumes that; the people that wrote the
15 permit for Cypress Plateau assume that; your permit
16 assumes that; Crandall Canyon assumes that. I think it
17 fits with the regional model.

18 Q Is it possible that the old component that
19 you testified to comes from an area outside the permit
20 area?

21 A It's possible, yes.

22 Q Okay. That's it?

23 MR. SMITH: Is it probable?

24 THE WITNESS: It's probable. I mean you're
25 talking a regional groundwater system that could be

1 recharging all the way from points above the mine clear
2 up through Gentry Ridge, the whole area. That's why
3 you've got this whole new water thing.

4 MR. CARTER: Well, let's break here for 10
5 minutes. Thank you.

6 (Recess taken.)

7 MR. CARTER: Well, let's go back on the
8 record.

9 MR. APPEL: I want to ask a question.

10

11 FURTHER EXAMINATION

12 BY MR. APPEL:

13 Q Back to the -- what was it? Potentiometric
14 surface diagram in Exhibit 5, you reviewed the -- there
15 was an issue about controls?

16 MR. CARTER: Can you hear? Okay.

17 MR. SMITH: You need a gavel.

18 MR. APPEL: Tell them we're resuming.

19 MR. CARTER: Hold it down back there.

20 Thanks. Go ahead.

21 Q BY MR. APPEL: Is there anything you want to
22 say about the potentiometric surface on Exhibit 5
23 concerning the drill holes and availability of data?

24 A Yeah. There was a discussion about the
25 actual occasion of contours associated with faulting on

1 either side. And that there is some issue there exactly
2 where those contours should be. However, if you look at
3 the location of the wells, or the points that I used, the
4 intercept of the mine, if you do a simple three-point
5 problem between like SDH-1, DH-4 and DH-2, you still
6 intercept that same potentiometric surface at that
7 location, regardless of what the contour's doing on
8 either side.

9 MR. CARTER: Okay.

10 THE WITNESS: That's the point I wanted to
11 make.

12 Q BY MR. APPEL: Okay. Do you have anything
13 more on tritium?

14 A No, I think we've beat that one up.

15 Q Well, shall we brutalize deuterium?

16 A Let's move on.

17 Q Did you form an analysis of deuterium?

18 A Yeah. We sampled deuterium and oxygen, and
19 it's found on Plate 8 of Exhibit 4, very last one. I've
20 got some different data sets to show changes between
21 deuterium and delta 18 on Plate 8. And there are some
22 differences that I've been able to show here.

23 The Gentry Mountain Springs found in Table 1
24 are the diamonds that you see basically above and below
25 this global meteoric water line.

1 Q What is that?

2 A The global meteoric line.

3 Q Meteoric?

4 A Meteoric water line, comes from Craig. He

5 put that together I believe from global values of

6 deuterium and oxygen 18 and came up with a line

7 representing an average value worldwide of that, and you

8 may have a local meteoric water line that is slightly

9 different than this, but this is the global average of

10 what that line represents.

11 Q And what does that line represent? What

12 does it tell us?

13 A It shows a depletion or an enrichment of

14 these various isotopes based on temperature or elevation,

15 latitude kind of a thing.

16 Q Okay. How do you measure --

17 A That's what it shows.

18 Q How do you measure that?

19 A We collected these samples in polyethylene

20 bottles and delivered it to Geochron Labs in Cambridge,

21 Massachusetts.

22 Q And they do the hard work?

23 A They do the analytical on it, yes.

24 Q And what do the values that they provide you

25 tell us?

1 A The Gentry Ridge, the Gentry Mountain
2 springs that we collected fall on the meteoric water
3 line, above and below it, generally group on that line.
4 I also pulled some values out of the literature. There's
5 a clumping of points represented by squares, sort of in
6 the middle and above the meteoric water line. Those are
7 water samples that I collected when I worked at Star
8 Point Mine from both floor samples and roof drippers.

9 You can see that they're distinctively
10 different than the Gentry Mountain springs, and I also
11 included some values from the Wasatch Range, which are
12 both diamonds or triangles and circles. They are below
13 the meteoric water line and below the Gentry Mountain
14 springs.

15 I also included points down towards the
16 minus 19 of delta oxygen 18 that I collected from a
17 groundwater study that we did in Hayden, Colorado,
18 northwestern Colorado, and you can see that it's
19 distinctively different as well.

20 This shows that there are different trends
21 from delta 18 and delta deuterium values that can be
22 probably related to changes in elevation or some sort of
23 continental effect, some sort of rain-out effect where
24 you're depleting one versus the other, something like
25 that. Several mechanisms have been proposed for shifts

1 along this line.

2 Q And how do these values help you to
3 understand what's -- what problems may have been created
4 by the mining?

5 A The one thing that it shows is that the
6 springs that we sampled in this area all fall relatively
7 in the same area. There's no major shift between the
8 water coming in the mine and the water discharging from
9 the springs. Assuming -- if there's a clump here, you
10 have to almost assume that they recharge either at the
11 same temperature or same elevation or both, generally.

12 Q So does this help us to understand the path
13 water takes to come out the springs in the mine?

14 A Well, what it suggests is that there's no
15 difference in the actual groundwater flow path for the
16 water entering the mine and the water discharging from
17 the springs.

18 Q Okay.

19 A Otherwise if one was an older water that
20 recharged several thousand years ago, you may have a
21 shift like we see at the Gentry Ridge Star Point Mine.
22 There may be differences in average temperature that
23 these things recharge at, therefore an enrichment or
24 depletion difference.

25 MR. CARTER: May I ask a question? What is

1 the order of magnitude of age that deuterium tells us
2 about? Prebomb, postbomb is --

3 THE WITNESS: This doesn't have anything to
4 do with age. This is an isotopic enrichment or
5 depletion --

6 MR. CARTER: Okay.

7 THE WITNESS: -- of oxygen and hydrogen.
8 Yeah. So this isn't age dependent. This is based on
9 fractionation based on temperature or dissolution of a
10 mineral that either increases or decreases the
11 concentration of this isotope in water.

12 Q BY MR. APPEL: Okay. So by means of
13 conclusion, what does this tell us about the water from
14 Birch Spring, Big Bear Spring and the water you sampled
15 in the mine?

16 A It tells me there's no difference in the
17 recharge location for these waters.

18 Q Okay. And that recharge location is where?

19 A Gentry Mountain.

20 Q All of it?

21 A All of it. All of Gentry Mountain.

22 Q Okay. The ball's in your court.

23 MR. CARTER: Anything over there?

24 Questions?

25 MR. MAYO: We're going to try to do better.

1 I have a couple questions, Peter.

2 THE WITNESS: Okay.

3

4

FURTHER EXAMINATION

5 BY MR. MAYO:

6 Q The samples, you only performed one sampling
7 event for each spring?

8 A Yes.

9 Q And so we only have analyses that represent
10 either the -- well, it would be a low flow condition or
11 a high flow condition?

12 A Yeah. These -- I think these were
13 collected typically on a base flow condition.

14 Q Except for the ones McCadden Spring and Bear
15 Canyon Spring, which would be June?

16 A Yes. I can't get to it. Yes. Those are
17 sampled in June.

18 Q Would you anticipate seeing a difference in
19 some springs between the fall sampling event, the base
20 flow condition versus perhaps a high flow event in the
21 springtime?

22 A I don't think you would because I think it
23 all recharges at the same period, during snow melting. I
24 think very little -- I think very little recharge enters
25 the system from say a summer precipitation event which

1 may recharge at a higher temperature and a different
2 concentration. I think the majority of the water here
3 recharges during snowmelt. Therefore it should recharge,
4 it is approximately the same temperature and the same
5 approximate values of oxygen 18 and deuterium.

6 Q That's all I have.

7 MR. CARTER: All right.

8
9 FURTHER EXAMINATION

10 BY MR. APPEL:

11 Q Okay. Let's talk about carbon 14. Did you
12 perform any analysis with respect to carbon 14?

13 A We collected carbon 14 samples from the five
14 springs that discharge from the Star Point sandstone, Big
15 Bear Spring, Little Bear Spring, Birch, upper Tie Fork
16 and lower Tie Fork.

17 Q And what was the procedure you utilized?

18 A We collected 10 gallons of water in plastic
19 bottles. We added sodium hydroxide to a PH of 11, added
20 barium chloride to precipitate out barium sulfate and
21 calcium sulfates, or barium sulfate and barium
22 carbonate. There we go.

23 Q And then what did you do?

24 A We collected the precipitate and sent that
25 off to Geochron Labs for analysis.

1 Q Where is Geochron Labs located?

2 A Cambridge, Massachusetts.

3 Q Okay. And after they did the hard work,
4 what were the results?

5 A The results are shown over in the second,
6 the last two columns of Table 1. It shows --

7 Q Where it says ^{14}C 's?

8 A Yes, ^{14}C , activities and ^{14}C , age. ^{14}C
9 activity of Little Bear, Birch Spring, and the upper and
10 lower Tie Fork springs are modern water. They range from
11 the lowest of 56.18 in the upper Tie Fork to 72.2 at the
12 lower Tie Fork. Those are modern, modern water. The
13 only one that was slightly datable, it was right on the
14 verge of being dated, was Birch Springs with a 45.3
15 percent modern carbon activity.

16 Q And why is that? Why was it so difficult to
17 date?

18 A Carbon 14 is produced in the atmosphere at a
19 more or less constant rate. It enters the groundwater
20 system and is diluted by dissolution of carbonate
21 minerals in the soil zone. So you assume a starting
22 ratio of 50, 50 PMC for a groundwater dating system
23 because of dilution of essentially dead carbon, carbon
24 from carbonate rocks, things like that.

25 Q Okay. And what does your carbon 14 data

1 show you?

2 A As I said before, it shows us that the water
3 coming out of Big Bear, Little Bear, upper and lower Tie
4 Forks is modern water, and that at Birch Springs, based
5 on carbon 14, is a slightly older water. The water we
6 got using various methods of adjusting for carbon
7 introduced into the system range from 750 to 800 years.

8 When I ran this same set of data through Net
9 Path to calculate the adjustment to carbon 14, it ranked
10 from zero to about 1800.

11 Q What's Net Path?

12 A Net Path is a geochemical program used to
13 determine geochemical reactions between two different
14 waters or mixed waters or examine the chemistry of a
15 water. It's a program by the USGS.

16 Q Okay. Your turn.

17

18 FURTHER EXAMINATION

19 BY MR. M. HANSEN:

20 Q I didn't understand why you got NAs on the
21 groundwater inflow samples.

22 A We didn't collect any in the mine.

23 Q You didn't collect any in the mine. So you
24 don't know what that result was?

25 A No. Unfortunately we don't have that.

1 Q It could show 20,000-year-old water,
2 couldn't it?

3 A Yeah, I guess it could. I couldn't say,
4 though.

5

6 FURTHER EXAMINATION

7 BY MR. MAYO:

8 Q Peter, I've a few questions. Could you
9 define modern for us?

10 A I didn't hear.

11 Q Could you define modern for us?

12 A As far as the ¹⁴C?

13 Q Yes.

14 A The modern water I'm defining as anything
15 with an activity over 15 PMC.

16 Q And what does modern mean?

17 A Modern means recharged in the last -- I
18 don't know -- current, current to several hundred years
19 ago.

20 Q Okay. And you did carbon 14 sampling only
21 one time from each site?

22 A Yes.

23 Q Either during base flow --

24 A Base flow.

25 Q -- or high flow conditions?

1 A We collected these in September, so you're
2 on the base flow conditions at the springs.

3 Q At Big Bear Spring, would you anticipate
4 having a different carbon 14 activity if you had done one
5 in June as well as in October?

6 A I think it would have been slightly higher,
7 the activity, yes.

8 Q What about at Birch Spring? What do you
9 think would happen?

10 A Birch Spring, since I don't think it shows
11 any component of modern recharge, it doesn't change. In
12 fact, I collected a sample at Birch Springs when I worked
13 for the Star Point Mine, and it had a nearly identical
14 tritium value collected at a different time of the year.
15 So to me Birch Springs doesn't change very much. So I
16 wouldn't expect the carbon 14 to change very much as
17 well.

18 Q What program did you use for calculating the
19 groundwater ages?

20 A First one I used the same program that I got
21 from you back in school. Somebody wrote it. I don't
22 know who wrote it, but I got it from you. I ran it
23 through there. They gave me that 750 to 800 range, and
24 then I took Birch Springs data and ran it through Net
25 Path with its different solutions for the age. And that

1 ranged from a negative 700 years to 1800, so --

2 Q Are you going to provide us with a listing
3 of the variables that you used for such things as carbon
4 14 gas, et cetera in the analysis?

5 A Yes, I can do that.

6 Q Let's go back to the -- in the mine. You
7 did not collect any carbon 14 -- you did not run samples
8 for carbon 14 in the mine?

9 A We aren't able to collect them. We didn't
10 collect them the one time we were underground.

11 Q But you did get sulfa 34 samples and carbon
12 13 samples?

13 A Yes. We didn't run it.

14 Q What would you anticipate would be the
15 carbon 14, the PMC of the carbon 14 if you had collected
16 those in-mine samples?

17 MR. APPEL: I don't know if I want him to
18 speculate.

19 MR. CARTER: Well, it's a -- this is
20 informal, so I guess he can.

21 MR. APPEL: You can say you'd like to hear
22 the answer to.

23 MR. CARTER: Well, I would like to hear the
24 answer.

25 MR. APPEL: You're in charge.

1 MR. CARTER: Thanks.

2 THE WITNESS: I think it would be similar to
3 probably Birch Springs, assuming that we did collect it
4 out of perched aquifers above and to the west of the
5 mine. I mean the Third West South and the Third West
6 Bleeder were collected west of the mine towards the same
7 fault zone that Birch is discharging from. I would
8 assume they would be in that range.

9 What it would be exactly I don't know. But
10 I'm assuming around 45 or 50, maybe a little more or
11 less.

12 MR. MAYO: And I have one more question.

13 Q Would it make any difference what time of
14 year that a carbon 14 sample was collected inside the
15 mine? Would that affect the result?

16 A If you see a significant increase in flow
17 that would be consistent with annual recharge that
18 wouldn't make a difference, but if you see subsequent
19 flows without an increase or decrease it probably
20 wouldn't change during any given time of year.

21 MR. CARTER: Okay. Thank you.

22

23 FURTHER EXAMINATION

24 BY MR. APPEL:

25 Q You performed another study to determine the

1 impact of mining, didn't you? Did you perform a study on
2 hydrologic conductivity?

3 A Yes, we did.

4 Q Tell me what you did procedurally --

5 A We collected --

6 Q -- to collect data.

7 A We collected pump test data from several
8 different sources in the literature, from both pump test
9 information by Co-op from the DH-1, 2 and 3 wells. We
10 collected it from information from the Cypress Plateau
11 area north and from Lines when he did his study on East
12 Mountain.

13 Q And what did you find?

14 A We -- I found -- we found that the Star
15 Point sandstone and the lower Black Hawk or sandstones in
16 the Black Hawk have a fairly high, relatively,
17 conductivity on the order of 10 to minus 2, 10 to minus 3
18 feet per day consistent with Lines on East Mountain, pump
19 tests in Co-op, and pump tests I performed up on Gentry
20 Ridge, the Star Point Mine.

21 Q What was the purpose of performing this
22 particular study?

23 A It was to determine the permeability of the
24 Star Point sandstone and the lower Black Hawk.

25 Q And how does that assist us in our mission

1 here today?

2 A It gives you an idea of the potential
3 velocity of groundwater flow or the capability of water
4 to flow through the system as far as volume and/or
5 gradient and/or velocity.

6 Q Okay.

7 A It's the water-conducting nature of the rock
8 is what it is.

9 Q And with respect to the issues we've been
10 examining today, how does it -- what does it tell us?

11 A It tells us that as I said before the Star
12 Point sandstone is a relatively permeable unit. 10 to
13 the minus 2 as compared, for instance, we looked at some
14 for another project, the permeability of the Navajo
15 sandstone. It was on the order of 10 to the minus 9, 10,
16 9, whereas we're looking at 10 to the minus 2, 10 to the
17 minus 3.

18 Q Okay. And what does that have to do with
19 water flow through the stratigraphy under Gentry Mountain
20 and with respect to the mine?

21 A It shows that the permeabilities are no
22 different in the Star Point sandstone on Gentry Ridge,
23 Gentry Mountain below the mine and in the stuff that
24 lines it. We're all looking at the same order magnitude
25 of hydrologic conductivity. There's no change in the

1 hydrologic conductivity in the Star Point sandstone.
2 It's fairly continuous. It's a good aquifer in the
3 sense.

4 Q Does that bolster your conclusion concerning
5 the regional aquifer nature of that body?

6 A Yes.

7 Q Okay. Does that result differ from what
8 Earth Facts found in the PHC?

9 A Their write-up of groundwater flow in the
10 Star Point sandstone, lower Black Hawk, Gentry Mountain
11 in general showed water flow to be very -- the word I'm
12 trying to say is different than everywhere else in the
13 Wasatch Plateau. Everywhere else, every other study on
14 the plateau suggested that this is a fracture-enhanced
15 system with significant water moving vertically through
16 fractures or fractures in the system. But that -- these
17 connections of fractures don't seem to exist in the Bear
18 Canyon mine permit area.

19 Q Did you find that to be the case?

20 A No. The fracturing, the permeabilities of
21 the lower Black Hawk Star Point sandstones are the same
22 in the Co-op permit area as it is in Gentry Ridge and in
23 general in the Wasatch Plateau. There's no difference in
24 the conductivities of these units.

25 Q And that's consistent with your field

1 findings as well?

2 A Yes.

3

4

FURTHER EXAMINATION

5 BY MR. MAYO:

6 Q I have a few questions. Were any pump tests
7 performed in the study itself?

8 A Yes. Co-op conducted slug tests of their
9 DH-1, 2, and 3 wells, of each individual sandstone
10 member.

11 Q The other pump tests that you were referring
12 to, these are slug tests?

13 A No. The ones that Lines did I believe were
14 pumping tests.

15 Q Okay. Do you know if Lines found any
16 boundary conditions in his pumping tests?

17 A I don't know that. No, I can't say that for
18 sure. I don't know one way or the other.

19 Q Okay.

20 A I don't recall.

21 Q Were these observation well response tests
22 or were these single well tests?

23 A Single well tests he did in -- yeah,
24 they've been single well tests, borings he did as part of
25 the work on the East Mountain coal reserves and hydrology.

1 Q Did he do recovery tests with those?
2 A I don't know for sure. I'd have to look
3 again.
4 Q Okay. I'm wondering, did the results follow
5 a Theisian solution?
6 A I'd have to look again. I don't recall.
7 Q Okay. This is not a test.
8 A I don't know.
9 MR. APPEL: Boy, it sure sounds like it.
10 THE WITNESS: Just like the old days here.
11 MR. APPEL: That was a Theisian what?
12 MR. MAYO: Theisian solution.
13 THE WITNESS: I don't know. I'd have to
14 look at the reports again to see what methods he used.
15 MR. CARTER: I'm going to ask a question
16 again for my own clarification. Back in the foggy past,
17 your questions are leading to the mechanism by which the
18 results with regard to permeability were arrived at.
19 In other words, is this permeability
20 characteristic of a homogeneous environment or is it
21 permeability that's skewed somehow because there's either
22 a barrier or a conduit that's giving you a different
23 answer? Is that basically it?
24 MR. MAYO: That's part of it.
25 THE WITNESS: Yeah.

1 MR. CARTER: Okay. Thanks.

2 THE WITNESS: The one thing that Lines also
3 did, he did these aquifer pumping tests, but he also sent
4 cores off and did hydrologic vertical and horizontal
5 hydrologic conductivity which also fell in the same
6 ranges as the ones he did in the pumping tests, except
7 two of the vertical hydrologic pumpings were in a
8 magnitude 26 or greater. And when he compared those to
9 the cores, the ones that had the higher vertical
10 conductivities were fractured, which makes sense.

11 Q BY MR. MAYO: That was my next question.
12 How do we distinguish from these values that you're
13 presenting here, this 10 to minus 2, 10 to minus 3? How
14 did you distinguish between vertical and horizontal on
15 conductivity?

16 A I don't think you can because this is a
17 fractured system; hence, this is representative of the
18 general hydrologic conductivity.

19 Q Were any tests performed specifically on the
20 coal seams?

21 A Not to my knowledge.

22 Q Do we know what the hydrologic conductivity
23 of the coal seams are?

24 A Based on a pump test, no. But I believe
25 there was a study done in regards to coal bed, methane

1 extraction of the permeability of the coal seams, and I'm
2 thinking -- do you want me to speculate? I can't
3 remember.

4 MR. APPEL: If you're thinking, go ahead.

5 THE WITNESS: I'd have to look it up for
6 you, but I think they were on the order of 10 to the
7 minus 3, 10 to the minus 4. On the coal, we're looking
8 at gas moving through the coal.

9 Q BY MR. MAYO: Were any tests performed on
10 the clay layers that underlaid the coal seams?

11 A Not to my knowledge.

12 Q Do we know what the hydrologic conductivity
13 of those were either vertically or horizontally?

14 A Not measured, no.

15 Q Based on the K values that you've got, the
16 10 to minus 2, 10 to minus 3, have you performed a travel
17 time analysis looking at your equipotential lines?

18 A I haven't.

19 Q That's all.

20 MR. C. HANSEN: I've just got one question.

21 MR. CARTER: Okay.

22

23 FURTHER EXAMINATION

24 BY MR. C. HANSEN:

25 Q Did you run any permeability tests on the

1 formations above the Black Hawk or the upper Black Hawk?

2 A Yeah. Lines did. He did two
3 permeabilities. He did a test in the Price River
4 formation and the North Horn formation and had
5 permeabilities of 1.6 times 10 to the minus 2 and 2.2
6 times 10 to the minus 1 feet per day.

7 Q Did he specify which zones within those
8 formations he was testing?

9 A He has an interval, and I'd have to look at
10 the elevations of the borings. But he gives the
11 interval.

12 Q He describes the lithology?

13 A Yes. He has lithology and he gives the
14 interval he tested using Packard's tests.

15 Q But we don't have any in the upper Black
16 Hawk?

17 A No. He just has the Black Hawk formation of
18 the sandstone. Yeah. He did 85 to 696 feet is where he
19 pumped on his, and he has a 1.6 to the 10 to the minus 1
20 value feet per day.

21 Q But he didn't isolate particular zones
22 apparently? I'm just wondering if he tested any of the
23 finer grain sediments in the Black Hawk. It sounds like
24 he just --

25 A Well, one of the shale, actually I believe

1 that -- I believe that in the core samples one of the
2 shales in I think the Black Hawk was tested as well and
3 had a really small permeability of 10 to minus 7, 10 to
4 minus 8.

5 Q That's what I recall. I believe that came
6 out of a lab core sample I believe, that value.

7 Is there anything else you'd like to say
8 about permeability?

9 A I think the permeabilities that we've
10 collected north of the study area, west of the study area
11 and in the study area, are consistent enough to say that
12 this is a permeable system, whether it's some component
13 of vertical/horizontal recharge.

14 Now I have looked at well logs during
15 drilling of the in-mine samples, and in a couple
16 instances fluids were lost, drilling fluids. I've looked
17 at what they did for the drilling coal exploration
18 projects west of the mine, and below the Hiawatha.

19 They had significant problems with fluid
20 loss in the North Horn and the Price River, Castlegate
21 formations. That was their major concern drilling all of
22 those. The Hiawatha Mine in-borings had significant
23 fluid losses in several of theirs, and we experienced the
24 same condition up on Gentry Ridge.

25 When we drilled through the lower Black Hawk

1 we would experience fluid loss.

2 Q Anything --

3 A What it suggests is that some areas the
4 water may not conduct through fracturing, but fracturing
5 is a significant component here for either horizontal or
6 vertical flow between these systems, even through some of
7 the shales.

8 MR. CARTER: Let me ask a question I think
9 from what we talked about last time, and that was that
10 overall as a system, I recall that the testimony was that
11 the relative permeability, the relative vertical
12 permeability was in order of magnitude less than the
13 relative horizontal was. Was it one magnitude?

14 THE WITNESS: One order generally, except
15 what Lines found and his was one order of magnitude
16 larger. But that was associated with fracturing in the
17 core when he tested his here.

18 MR. CARTER: In the fracture itself?

19 THE WITNESS: Cores with fractures in it.

20 MR. CARTER: I was interested in the
21 system. I mean overall system.

22 THE WITNESS: System, yes.

23 /////

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FURTHER EXAMINATION

BY MR. APPEL:

Q Okay. Now you performed another study which was a review of flow rates at various springs?

A Yes.

Q Would you tell us what you did in that regard?

A We collected measured flow rates using meters from several of these large volume springs in the area. On Exhibit 4, Plates 1, 2, 3 -- let's see, Birch, Big Bear, Lower Bear, upper Tie Fork, yeah. Plates 1 through 4 are flow rates from Birch Springs, Big Bear Spring, Little Bear Spring and upper Tie Fork, north of the study area.

Plate 5 is the Bear Canyon Mine discharge we plotted up. Plate 6 shows monthly average, monthly precipitation average from all six of the weather stations that we collected information from; flow in Huntington Creek at the power plant as well as the trend of the data. That's the heavy thick line.

All of those are summarized in page, in Plate 7 that we've already discussed where we have precipitation in all, and then all three of the springs.

Q Okay. And how did you collect all that

1 data? Tell us about the procedure.

2 A This information was collected by Castle
3 Valley Special Services and the North Emery Water Users
4 on information from meters on the spring collection
5 systems.

6 Q So this is historic information?

7 A Historic information, yes.

8 Q Okay. Now what do these charts tell us
9 about changes in flows and -- let's start with changes
10 in flows based upon just precipitation, natural
11 responses.

12 A Okay. On Plate 7 or Plate 6, whichever
13 one's easier to look at, the dashed line represents
14 average monthly precipitation for the study area. You
15 can see between water years 1978 to 1986, the area
16 experienced relatively high precipitation with declining
17 precipitation between '86 and about 1990, 91. Whereas
18 precipitation has increased again to almost record levels
19 in the last couple years.

20 And if you look at the trend of all that
21 data that we fit here, that heavy line on Plate 6, it
22 shows a nearly lean year constant precipitation; no
23 drastic increases or decreases in precipitation over the
24 period of record.

25 It's nearly, nearly constant as a period of

1 record goes. Even though we do have fluctuations, it's
2 nearly constant. So we're not seeing a drastic increase
3 of precipitation in the record area nor are we seeing a
4 drastic increase in precipitation.

5 Q Okay. Now let's turn to Plate 7.

6 MR. CARTER: Now let me ask one question.
7 Huntington Creek is the bottom line for the whole
8 system?

9 THE WITNESS: That was the heavy black line
10 is Huntington Creek.

11 MR. CARTER: And that -- I mean functionally
12 Huntington Creek would be in terms of this whole
13 hydrologic system. This would be --

14 MR. APPEL: The drain.

15 MR. CARTER: The bottom line.

16 THE WITNESS: Yes, exactly.

17 MR. CARTER: So it would have the most
18 buffering effect in terms of seasonal fluctuations and
19 any other thing you could measure?

20 THE WITNESS: Yes, yes. And if you look at
21 the flow on Plate 6, Huntington Creek, like periods of
22 high annual precipitation you've got high peak there
23 basically, and it decreases following decrease in
24 precipitation, and then increases again with increasing
25 precipitation.

1 Q BY MR. APPEL: But there's a lag?

2 A Yeah. There's a lag. There's a lag
3 period. The total precipitation does not represent say
4 yearly snowfall. It's the total equivalent precipitation
5 based on snowfall and precipitation. It's a total inches
6 for year of water is what that is.

7 Q Okay. Let's turn to Plate 7, if you're
8 ready. Anything more you'd like to say?

9 A Well, the one comment here is that the lag
10 on Huntington Creek on Plate 6 typically occurs from
11 April to June and July, regardless of whether you've got
12 high or low precipitation or, you know, the early part of
13 the data period or the later data period.

14 During high precipitation it was the same,
15 during the declining precipitation it was the same, and
16 during the recovery precipitation since 1990 the lag has
17 not changed. It occurs at the same time to peak flows.

18 Q Okay.

19 A Typically April to June, July.

20 Q Are you ready for Plate 7?

21 A We are ready.

22 Q Tell us what Plate 7 demonstrates.

23 A Plate 7 as we mentioned before has the three
24 historical flow rates, Little Bear being the upper curve,
25 Big Bear being the middle curve and Birch being the lower

1 curve, Little Bear being our control point. You'll
2 notice that during the period of higher precipitation we
3 had higher discharges, peak flows on the order of between
4 400 and 450 gallons per minute with average higher base
5 flow discharge. You can see the peaks are shorter. That
6 indicates that the higher level of saturation was
7 achieved in the aquifer supplying Big Bear or Little Bear
8 Spring.

9 Little Bear shows a decline following -- in
10 the '88 water year, shows declining base flow following
11 the paths of declining precipitation. You lower the
12 recharge, we start dewatering the system.

13 And that's what you see on that big slope up
14 until about February of '91. And then we see recharge
15 again occurring following increases of precipitation
16 until we've received record flows as Big Bear Spring with
17 record precipitation.

18 Not only is the peak flow increasing but the
19 recession is higher on Little Bear Spring, increasing,
20 suggesting that the aquifer's resaturating with the
21 increased recharge.

22 Q Okay. Now I'm noticing a rather marked,
23 marked change in these graphs at about December of '86
24 with respect to everything but Little Bear Spring.

25 A Yes.

1 Q How do you account for that?

2 A First you'll notice that Big Bear and Little
3 Bear had nearly a similar response to recharge pre-1985,
4 86; similar peak flows, similar increases in base flow
5 recession. Following 198 -- beginning in 1986, you see
6 that Big Bear Spring is generally on a reclining,
7 declining base flow curve here.

8 You see some smaller peaks that occur June
9 to July indicating recharge and a peak flow, but
10 generally it's on a declining recession down through here
11 until you hit a bottom around May or probably like
12 August, July, August of 1990, at which point it increases
13 again.

14 There's a little peak around December,
15 February of 1989 or 1990 where you see a peak flow.
16 That's not characteristic of an annual recharge, seasonal
17 recharge to occur in December and January of that
18 magnitude.

19 Big Bear was declining along a base flow
20 recession curve dewatering the aquifer, probably because
21 of both declining precipitation and impacts to mining.

22 Q When did mining begin?

23 A I think mining significantly began in 1984
24 and 85. And assuming that it takes a period of time for
25 subsidence to occur to alter some of the groundwater flow

1 patterns, this is in time with alteration of the
2 groundwater flow system by mining.

3 Q Is it fair to say that Little Bear continued
4 to respond to precipitation the way you'd expect?

5 A Well, between December of '86 and January or
6 February, April of 1989 it did. You see peaks occur
7 about the same time, June and July. But following that
8 you've got a peak occurring in January, and then you've
9 got increasing flows that start about June and increase
10 till about May of 1992 and then decrease again, which is
11 very uncharacteristic compared to the beginning part of
12 the flow curve for Big Bear Spring.

13 Q Did Little Bear continue to respond to
14 precipitation the way you'd expect?

15 A Little Bear responded to precipitation as
16 you'd expect. You see peak flows all the way to the
17 declining part of it and the increasing part of it
18 following 1990.

19 Q What is your review of what's happening to
20 Big Bear Spring right now based upon this data?

21 A Based upon this information, looking at
22 changes between the first part of the curve premining and
23 post, the latter part of the curve when mining occurred
24 at Big Bear, there has been a change that cannot be
25 accounted for by natural changes in recharge or any other

1 event. If we had had a significant deforestation event,
2 forest fires or significant changes, that would have
3 showed up in Huntington Creek as well.

4 Q Does it?

5 A But here, it does not show up there. Peak
6 flows have not changed. If there was a significant
7 warming event for say several years where peak flows
8 occurred in February or March, that would shift the lag
9 time one way or the other in Huntington Creek, and we
10 haven't seen that. We haven't seen that in Little Bear.

11 What we've seen is a steady decline. From
12 1986 down to 1990 you see a change in the peak flow at
13 Little Bear. You see increases through winter and spring
14 months, which are not characteristic of the premining
15 flow pattern at Big Bear.

16 Q So how would you compare the current flow
17 pattern with the prior flow pattern?

18 A The current flow pattern after that increase
19 between 1991 and October of '92 may represent recharge
20 into the area that's been what I would call muted. You
21 don't see the same recovery like you did at Little Bear.

22 The only thing that's changed between these
23 two springs is the mining in the Hiawatha and the tank
24 seams in the Blind Canyon seam. If water's intercepted
25 by these mines, it's put into sumps, it's used, it's

1 discharged out the portal, goes out as evaporation in the
2 ventilation system.

3 If you're moving water from the system or
4 you're storing it and recharging it at different times of
5 the year, you get these peak flows. You'll also notice
6 that the last part of the curve, that peak flows are
7 different. They're occurring September to December where
8 they used to occur in April, June, July. So even though
9 we do have a peak flow showing every year, it's shifted
10 by several months.

11 Q Is Big Bear Spring responding to
12 precipitation events the way it did prior to 1986?

13 A No, it's not.

14 Q Okay. And what do you believe the cause of
15 that to be?

16 A When we looked at this study, we tried to
17 look at natural causes, meaning we looked at deportation
18 or man-made events or any other thing that would have
19 happened, changes in precipitation. And during a period
20 of increasing precipitation, Big Bear Spring is both
21 lower than it has been historically, with peak flows
22 occurring at different points in time. With all the
23 other springs that are responding, Little Bear's
24 responding as it did before, upper Tie Fork is responding
25 as -- well, there's some complications with the upper

1 Tie Fork because of mining above it, but lower Tie Fork
2 is also responding. Its peak flows occur in April to
3 June, just like it's supposed to.

4 Q Okay.

5 A The only difference is the beginning of
6 mining in 1986 to 1985, between these two periods of
7 time.

8 Q What other possible reasons have you
9 eliminated in your query which leads you to the
10 conclusion it's the mining impacts you're seeing here?

11 A We've eliminated any natural factors that
12 could change precipitation in a significant way here,
13 that would change the recharge or changes, say an early
14 runoff period where you've got runoff occurring in
15 February, March versus April to June.

16 Q So these flows are down from what they
17 should be; correct?

18 A Yeah. I calculated sort of a premine,
19 postmine flow, and I think the changes are on the order
20 of 48 to 56 percent decrease in average flow. Not peak
21 flow, but if I take the flows before 1985, average them,
22 and the flows after 1985, there's a 48 to 52 percent
23 change in inflow.

24 Q We've had an increase on an average basis of
25 precipitation over the past four or so years; correct?

1 A I calculated 11 percent change in
2 precipitation pre-1985 to the water record up to 1985
3 versus post '85 to current. 11 percent changes versus 40
4 to 50 percent in the springs.

5 Q Are you seeing that increase represented in
6 the flows of Big Bear Spring?

7 A No.

8 Q So it's no longer --

9 A We see a muted, a muted effect in Big Bear
10 Spring following the increase in precipitation.

11 Q Okay. Let's talk for a moment about --
12 well, one more thing. Does it appear to be recovering?

13 A It has recovered slightly, but it's still
14 significantly less than what was occurring before mining
15 occurred.

16 Q In your opinion will it ever recover fully
17 from the effects of mining?

18 A I don't think it will recover until several
19 years following the completion of mining, assuming that
20 the mine floods.

21 Q Okay. Let's talk for a moment about Birch.
22 Birch appears to be on Plate 7, referring to that.
23 Appears to be in a fairly steady state until there's some
24 marked spikes. Do you know what caused those spikes?

25 A Yes. As I mentioned there's a fairly

1 consistent flow ranging from 83 to 88 gallons per minute
2 here around in Birch Spring until about August, September
3 of 1988. This increase in flow, this spiked increase
4 here may possibly be because of the Emery County
5 earthquake. We saw that similar effect in upper Tie Fork
6 Canyon; that peak represents compression of the system
7 and water flowing upward probably saturating the fault
8 system and the aquifer and then a sharp declining as that
9 is dewatered.

10 Q Okay. Any other causes of that that you can
11 think of?

12 A For that first spike the other cause may be
13 discharge from potentially Trail Canyon, which is
14 upgradient and in the same fault zone, or from discharge
15 from the Blind Canyon seam.

16 Q Okay. Now Birch Springs appears to be in
17 decline as well. Do you have any reasons for that?

18 A The consistent flow and then the peak flows
19 and then the decline suggest that in a period of
20 increasing precipitation something else is happening.
21 We've already ruled out natural factors. The only thing
22 that could happen is mining has intercepted flow which
23 would normally go to Birch Springs and has diverted it
24 somehow. You'll notice that the flow from the first part
25 of 1985 till the event in August of 1988 was consistent

1 between '83 and '88 and it's nearly, if not horizontal,
2 very little change. You'll notice --

3 Q And it's consistent at what rate of flow?

4 A Well, it varied between 88 and 83 gallons a
5 minute, be around. It would fluctuate.

6 Q Okay.

7 A But average it didn't change. It's
8 horizontal. You'll notice that the flow following
9 approximately August, September of 1990 is on a declining
10 trend to the period of record that we have. That
11 suggests that Birch Springs is dewatering the system,
12 groundwater system associated with it and it's not being
13 recharged.

14 That leads to a natural conclusion that the
15 water's going somewhere else, and the only thing that we
16 can factor in that area is the mine. That's the only
17 thing that's upgradient of it that could affect that.

18 Q Okay. So you believe it's intercepting
19 water that would have ultimately ended up at Birch
20 Springs?

21 A Somehow that water's being diverted, yes.

22 Q Has the amount of water coming out of the
23 mine increased correspondingly?

24 A It hits significant flows in various parts
25 of the mine. Some of their mine inflow surveys suggest

1 an average flow rate from the northern part of the mine
2 of around 110 gallons a minute. And right offhand I
3 don't recall what they're flowing at now, but it varies
4 between 80 gallons a minute, some as high as 500 gallons
5 a minute, 300 gallons a minute. So that is water that
6 would normally go somewhere downgradient that's being
7 diverted out through the mine now.

8 Q Okay. Have you seen any evidence of
9 subsidence created by the mine in this mine?

10 A We have seen subsidence in Dry Canyon, which
11 is not associated with this mine, but with the Trail
12 Canyon Mine probably. It's been stated to me that there
13 is subsidence above Birch or Big Bear Springs by Darrel
14 Leamaster. Some of their mines show breakouts in the
15 canyon above Birch Springs. When we was in the mine
16 there was several locations where we saw floor heaves,
17 indicating downward changes in the floor rock below the
18 Blind Canyon seam. Yeah, there is -- there is effects
19 occurring.

20 Q What impacts do you believe continued mining
21 of this seam will have on the water sources of the
22 objectors?

23 A I looked at several studies of subsidence
24 and groundwater impact for room and pillar mining and
25 retreat mining from studies that were done in Iowa and

1 back east with similar but not the same lithologies.
2 I've also talked with several mine engineers that say
3 that subsidence by room and pillar and retreat mining is
4 similar to that you get from longwall except it takes
5 longer to develop and you only get about half the
6 subsidence.

7 So if you're comparing the longwalling with
8 a room and pillar operation, the same effect's
9 occurring. It just takes longer for a room and pillar to
10 develop, with about half the features shown. Half the
11 subsidence occurs in room and pillar, but it's still
12 there.

13 So you get areas of compression, you get
14 areas of tension, and you also get areas of compression
15 and tension in the floor rocks. That's why you get floor
16 heaving inside a mine. This stuff continues to develop
17 for reports anywhere from 5 to 13 years. But you still
18 get subsidence occurring from room and pillar operations.

19 So that means that subsidence is still
20 probably occurring to some degree in the old works,
21 especially in the areas that have been caved, which is
22 down directly upgradient from Big Bear on the east side
23 of the canyon, and any further mining in the Hiawatha and
24 north will propagate this subsidence further northward
25 into the groundwater area.

1 Q And will that operate to change the historic
2 recharge and flow patterns to these springs?

3 A Sure. If you're subsiding the roof and
4 potentially the floor, you're either opening or closing
5 fractures, which is the conduit for flow vertically and
6 probably horizontally.

7 Q Okay. That's the future. Is it fair to
8 characterize your testimony that return flow patterns to
9 these springs has been altered by mining?

10 A Yes. That's the only factor we could put in
11 here. Pre-1985 and post-1985 is the mining.

12 Q And based upon what you've said, you don't
13 believe it's going to get any better, do you?

14 A Shouldn't get any better. They've
15 intercepted the flow and it's been diverted. Only change
16 is if the mine floods. But it's hard to say whether it
17 will recover to premining levels.

18 Q And you testified you've reviewed the PHC of
19 Co-op and all the baseline data?

20 A Yes.

21 Q Are there baseline monitoring systems that
22 have been developed?

23 A They don't have any baseline monitoring
24 going on nor have they -- there's no upgradient wells.
25 With the wells they do have upgradient, you can't get

1 information out of them. They don't have a baseline
2 monitoring program that I was familiar with before.

3 Q Is it a viable baseline monitoring program
4 required by the regulations of this state?

5 A When I worked at the Cypress Mine, we were
6 not allowed to mine north of the ridge area until we had
7 a full year of baseline data north of where we wanted to
8 go. You know, the same thing was required on several
9 mine permits I've worked on in Colorado as well. If you
10 don't have adequate baseline data, you was not issued a
11 permit.

12 Q But in this case a mine's permit had been
13 issued without adequate baseline data?

14 A I believe so.

15 Q Okay.

16 A They had nothing upgradient of the natural
17 mine area.

18 Q Tell me a little bit about your experience
19 developing adequate baseline monitoring.

20 A If you've designated an area that you're
21 permitting for a mine works, you've got to have
22 upgradient information, downgradient information and
23 water levels within the mine area for baseline data.

24 If you've got three wells in the mine permit
25 area, that does not qualify as an upgradient well.

1 Q Okay. What is necessary to develop an
2 adequate baseline for this particular mining effort, in
3 your view?

4 A You need to either replace their wells or
5 figure out how to get water level information out of
6 them.

7 Q Would additional wells assist?

8 A Possibly.

9 Q If you were to design a permit, I'm sorry, a
10 monitoring effort based on your experience for this
11 permit, what would it consist of?

12 A It would consist of replacing the two wells
13 that they have up north and potentially putting one
14 closer to the southern end of the mine to generate
15 accurate groundwater information say in the Star
16 Point/Lower Black Hawk aquifer, which is the regional
17 aquifer in this area.

18 Q Anything else?

19 A The one thing that we were required to do as
20 far as our permit, and then we've been required to do on
21 other permits I've worked on, is develop a detailed
22 hydrological budget of water that is intercepted by the
23 mine, water that's used in mining, water that's
24 discharged, including both mine discharge and evaporation
25 losses by ventilation. I haven't seen anything like that

1 in the Co-op permit.

2 Q Okay. Anything else?

3 A No.

4 Q Okay. Does this mine appear to have been
5 regulated differently than the mines, other mines in this
6 area you've had experience with?

7 A I believe so.

8 Q Okay. I'd like to turn for a moment to some
9 of the Earth Facts' testimony and conclusions. And
10 you've read Earth Facts' reports?

11 A Yes.

12 Q You've also read their testimony before the
13 Board --

14 A Yes.

15 Q -- of Oil, Gas and Mining?

16 A Yes.

17 Q Okay. I've going to give you several
18 conclusions and I want you to tell me whether they're
19 right, wrong, or if there's something in between. Feel
20 free to describe that, if you can.

21 MR. M. HANSEN: Can I interrupt for just a
22 second before we move into this new area?

23 /////

24 /////

25 /////

1
2 FURTHER EXAMINATION

3 BY MR. M. HANSEN:

4 Q Mr. Nielsen, you said that the -- in your
5 opinion the Co-op Mine has been regulated differently
6 from the other mines in the area. Can you tell me how
7 so?

8 A When I worked at the mine we were mining
9 down Gentry Ridge from our entry mains. They don't show
10 up on that map, but they were north. It was the Star
11 Point Mine. My job there was to do mine permit
12 maintenance, hydrology and geology.

13 We were attempting to permit the northern
14 extension of that mine, and we were required to go in
15 there and drill several borings before we could have it,
16 and we had to have a full year's baseline, meaning four
17 samples over the course of the year before that was even
18 considered, including two groundwater samples.

19 So we were out there in the middle of winter
20 jumping out in very cold water to get the water levels to
21 collect this baseline information so we could get this
22 permit going. Your mine doesn't have any upgradient
23 information. The one well you do have is across the
24 fault, the Pleasant Valley fault. You've got one water
25 level in SD-2 and SD-1, and that's it. You have no

1 upgradient baseline information.

2 That was consistent with permits that I did
3 in Colorado where we had to have six or more wells
4 throughout the permit area so that we knew where water
5 was recharging, where it was flowing, and potential
6 effects.

7 Q Is there any other information that you're
8 relying on?

9 A For what?

10 Q For your opinion that Co-op Mine has been
11 regulated differently than other mines in the area?

12 A I'm relying on my information from my
13 experience in working in the mine and reviewing your
14 permit.

15 Q Okay. No other mines but Cypress and Co-op
16 Mine?

17 A That's the two I'm familiar with.

18 Q Okay.

19 A I won't speculate on any others.

20 Q That's it.

21

22 FURTHER EXAMINATION

23 BY MR. MAYO:

24 Q I have a few questions. Peter, on Plate

25 6 --

1 A Plate 6?

2 Q Plate 6, you drew a line where you log the
3 average monthly precipitation?

4 A Say again. I can't hear you.

5 Q You drew a line representing the average log
6 of the month's average, monthly precipitation?

7 A This chart was produced in Excel, and I just
8 produced a logarithmic trend line of the date.

9 Q And what's the purpose of this line?

10 A To see any increase or decrease, any trend.
11 It's a trend line.

12 Q How come you didn't do it for the other two
13 data sets?

14 A For Huntington Canyon?

15 Q Yes.

16 A The creek? We did do it for that. I just
17 haven't showed it.

18 Q What would they look like?

19 A It was also nearly horizontal. And we also
20 did it for the individual stations that we used in the
21 average precipitation calculations, and they range from
22 horizontal to slightly increasing to slightly decreasing.

23 Q And what about the average monthly
24 precipitation?

25 A On a wheel or individually?

1 Q If you had done a log of the average monthly
2 precipitation.

3 A That's what that log line is.

4 Q Okay.

5 A That's the logarithmic trend of the average
6 precipitation.

7 Q I'm sorry. But the Huntington Power Plant
8 data plots essentially the same?

9 A Essentially the same.

10 Q Okay.

11 A Essentially horizontal.

12 Q On Plate 7, there so much here it's hard to
13 figure out where to start.

14 A Yeah. There's a lot of data.

15 Q Let's start with the data itself.

16 A Okay.

17 Q What information did you obtain about the
18 way in which the data was collected and the circumstances
19 of those particular springs, in other words, changes in
20 the spring boxes, development of springs, when did those
21 types of things occur, et cetera?

22 A Big Bear and Little Bear have been developed
23 as a culinary spring since 1930s, 40's. Earlier?

24 MR. LEAMASTER: Different times on both.

25 THE WITNESS: Different times.

1 MR. LEAMASTER: Big Bear Spring in the late
2 1920s. Little Bear was in the 50's.

3 MR. CARTER: That was Mr. Leamaster for the
4 record.

5 THE WITNESS: That's when they were first
6 developed. Flow metering occurred on the springs when
7 the piping in the boxes were upgraded or reinstalled at
8 the systems. In fact for Birch too.

9 Q BY MR. MAYO: Do you know the dates -- this
10 may be well beyond the scope of what you can testify to.
11 I'm just trying to find out what it is that you know
12 about the data itself before you plotted it out and
13 started making interpretations from it.

14 Do you know of any changes in the
15 redevelopment of the springs, of installing meters,
16 differences in what a meter might show versus a bucket
17 and a stopwatch might show and times that those might
18 occur that might reflect the results of this graph?

19 A Yeah. If you look on for instance Little
20 Bear, well, even on Big Bear, you'll see gaps in the
21 record. That was indications in the data sheets where
22 the pipe was plugged, the screen was plugged or the flow
23 meter was not working properly or a pipe had broke, so we
24 didn't use that data.

25 Q Do you know if --

1 A All these are metered in the line.

2 Q Do you know if the flow metered data has
3 ever -- ever been calibrated again before they put the
4 flow meters in?

5 A The only thing I know about that is if you
6 look at flow measurements made by Danielson, I assume he
7 used the flume. Well, maybe not. Maybe he read meters
8 too.

9 MR. LEAMASTER: I could comment on Big
10 Bear. He read the meter at Big Bear that was installed
11 in that spring that was redeveloped in 1976 and 77. The
12 others I don't know.

13 THE WITNESS: You'll have to take that. I
14 don't know. He probably read the meters too. I don't
15 know if it's ever been compared to stopwatch and bucket.

16 MR. M. HANSEN: Excuse me. Are we getting
17 the record clear here on who's speak when?

18 MR. CARTER: Did you get that that was
19 Mr. Leamaster?

20 (Discussion held off the record.)

21 MR. CARTER: I think the best thing might be
22 for you to just testify what you do personally know
23 about, and then allow for those questions to be asked of
24 Mr. Leamaster. Does that make sense?

25 THE WITNESS: Yeah. I don't know if these

1 values have ever been clocked essentially with a bucket
2 and stopwatch. I don't know.

3 Q BY MR. MAYO: Here's what I'm really trying
4 to get at.

5 A What I do is that meter installed at low
6 flow is always saturated maintaining a low flow. And
7 since they were redeveloped and the pipes installed, the
8 period of record we have is the latest upgrade to the
9 spring boxes.

10 Q How do we get a chronology of when meters
11 were installed, when springs were redeveloped, when
12 meters were calibrated, that sort of thing?

13 MR. SMITH: It should be in the PHC.

14 THE WITNESS: I think it was also shown in
15 the testimony at the last meeting when Birch was
16 upgraded, and I believe you discussed that as well.

17 MR. CARTER: We should look at the record of
18 the last meeting to see what information is there and
19 then make a determination. You should decide whether --

20 Q BY MR. MAYO: There's some very specific
21 information that we'd like to have and this may not be
22 the format in which to get it.

23 MR. CARTER: Let me. We're closing in on
24 lunchtime here shortly. I think we'll go a little longer
25 before we break, but I'm not entirely sure what to

1 anticipate this afternoon.

2 But I think to the extent that information
3 that is new to Co-op has been introduced either today or
4 in the previous hearing, that I'm open to a request from
5 Co-op to marshal their resources and take a look at it or
6 to pose other questions or review the information that's
7 been submitted so far, everything that's in the file as
8 well, the Division file, to see if all that information
9 is there.

10 Because I couldn't tell you from here
11 whether there's been a detailed chronology of that kind
12 of information. So what I want to do is to hold this
13 record open long enough to get all of the relevant
14 information in, because I think I said last time this is
15 the last clear chance for the Division to do the right
16 thing, so I want to make sure we do the right thing.

17 So to that end I want to balance bringing
18 the record to a close against keeping it open long enough
19 to make sure we've got an absolutely complete record so
20 that when we make a determination, I'm hoping that it
21 will be based on every scrap of information available.

22 So I -- I don't know that Mr. Nielsen can
23 respond to the question or give you a detailed
24 chronology --

25 THE WITNESS: No, I can't detail.

1 MR. CARTER: -- of when the meters were
2 changed out and calibrated and so forth.

3 MR. MAYO: And I don't anticipate that
4 someone sitting here without having the data in front of
5 him could do that either. I'd just like to make sure we
6 can get the chronology of when these things really
7 occurred.

8 MR. CARTER: I understand. But I think
9 Mr. Nielsen's testimony was that based on the information
10 available to him, the variable that he sees that he feels
11 is the causal variable for these curves is mining
12 activity. And you're suggesting that you want to make
13 sure you're aware of all factual circumstances and when
14 they changed and so forth so you could --

15 THE WITNESS: Yeah.

16 MR. CARTER: -- decide whether you think
17 that's right or argue there may be some other factors
18 that play.

19 MR. MAYO: We just want to make sure we
20 understand everything that's been --

21 THE WITNESS: I believe the data as far as
22 the dates that we have for the period involved we have
23 represents the latest major upgrade for the spring as far
24 as meters or changing boxes. Anything else hasn't been
25 used so it's a continued record totaled monthly or

1 bimonthly or something like that.

2 Q BY MR. MAYO: I have one more question that
3 relates to Plate 7. Looking at these hydrographs we see
4 peaks and valleys.

5 A Mm-hmm.

6 Q What do the valleys represent?

7 A The valleys represent a base flow recession
8 of flow. And then you get your increase in flow due to
9 annual recharge.

10 Q I think that's all I have.

11 MR. CARTER: All right.

12 MR. C. HANSEN: Jim, could I maybe just make
13 one statement to help clarify his question? The meters
14 that we have on Little Bear, Big Bear and upper Tie Fork
15 Springs have been calibrated and updated throughout this
16 time period. I don't have specific information, but
17 we've gone through, we have a program where those meters
18 have been removed, replaced, and then sent in and
19 reworked and recalibrated. So the flow information is
20 from those meters and we have periodically upgraded them
21 and undated them.

22 MR. CARTER: So all the information on Plate
23 7 would be generated by meters rather than buckets and
24 stop watches.

25 MR. C. HANSEN: It is meters. They're

1 installed in the line downstream from the spring.

2 MR. LEAMASTER: And we'll be able to get the
3 chronology of when those occurred plus the chronology of
4 when we redeveloped springs?

5 MR. C. HANSEN: We could provide that
6 information.

7 MR. LEAMASTER: All right. Thank you.

8 MR. SMITH: I've got some questions on Plate
9 7 that I want to take a few minutes and ask Mr. Nielsen
10 about.

11

12 EXAMINATION

13 BY MR. SMITH:

14 Q Directing your attention to Plate 7 flow of
15 Birch Spring, there's another spike that occurs beginning
16 in the fall of 1989, the biggest spike of the Birch
17 Spring flow. Can you see that?

18 A Yes.

19 Q And did you do an investigation as to what
20 was the cause, if that could be determined, of that spike
21 in flow?

22 A Yeah. We looked into that right there. We
23 interviewed Mr. Galen Atwood that used to work in the
24 Co-op Mine, and that corresponds with the same period of
25 time when they were discharging out of the ventilation

1 portals into Dry Creek.

2 Q So that's the time when they encountered --
3 began encountering increased, marked increase flow of
4 water?

5 A I would assume so, that they had to
6 discharge, it, yes.

7 Q And they were discharging it into --

8 A Into Dry Canyon at the ventilation portals
9 in the Blind Canyon seam. And that corresponds when we
10 had peak flow increases at Birch Springs.

11 Q Also, as I understand there was also a
12 marked decrease in water quality during that spike that
13 we're talking about, the 1989-90 spike; is that correct?

14 A Yes. If you look at Plate 1, this is a
15 single hydrograph of Birch Springs similar to that on
16 Plate 6. The dots represent sulfate concentrations and
17 the triangles represent TDS. You also know that we
18 don't -- you'll notice that we do not have a sulfate
19 analysis during that peak but we do have a TDS of which
20 is almost double the sort of average concentration that
21 occurred at that peak time.

22 Q So looking at the PHC on this, let me have
23 you look at a portion if I can find that I marked on the
24 PHC here of this one.

25 I've lost my marker here. It will take me

1 just a second to find that. Okay. I've found it.
2 Looking at page 2-38, and it's Appendix 7-N to the
3 revised hydrologic evaluation. I think they're talking
4 about the event. It says, "The Birch Spring flow
5 increased by almost 300 percent for a three-month period
6 and a reduction in water quality until the fall of
7 1989." That's what we've been talking about; correct?

8 A Yes.

9 Q Then it says the event -- skipping down a
10 line, it says, they don't know, but it says, "The event
11 occurred shortly after the Bear Canyon Mine intercepted
12 an inflow of about 110 gallons per minute."

13 (Interruption in the proceedings.)

14 The event occurred shortly after the Bear
15 Canyon Mine intercepted an inflow of about 110 gallons
16 per minute in the north mains, though the response of the
17 spring if there were mined -- a mine-related impact
18 would be a reduction of flow rather than an increase.
19 But that's not correct because when you talked to
20 Mr. Atwood he told you where that water they intercepted
21 was being put.

22 A Yes.

23 Q And where was that?

24 A The water's being intercepted. It was being
25 flooded into various sumps in the mine and eventually was

1 being discharged out the mine portals. We also have that
2 record from inspections of DOGM that they were pumping
3 out the portals.

4 Q And this was the same time, the same time
5 those pictures that we looked at earlier with the big
6 icicles on the side were taken; is that correct?

7 A The icicles were shortly after that.

8 Q And --

9 A Similar time, yes.

10 Q Similar time. And was this discharge in a
11 Dry Creek? Could you find anywhere that was either being
12 reported to DOGM at that time?

13 A I think the DOGM record stated that they
14 were discharging out the portal. To my knowledge. I
15 don't know if anything else was said about that. There
16 was a pipeline out.

17 Q Okay. Any kind of -- are you aware if they
18 had a discharge permit?

19 A No, they did not have a discharge permit
20 there.

21 MR. APPEL: Was there a meter there?

22 MR. M. HANSEN: I'm going to object --

23 THE WITNESS: I don't think there was.

24 MR. M. HANSEN: Excuse me. I'm going to
25 object. We've gone overboard I think allowing you to put

1 on your case, and we'll allow you to put on your case.
2 This witness I believe is called as an expert witness.
3 If you want to call a fact witness to testify to those
4 events, I'd like to have the fact witness here so that I
5 can cross-examine them. I don't think this individual
6 knows anything about the facts to which he's being asked
7 to testify.

8 MR. SMITH: I'll just move on. I think we
9 can deal with that objection at a later time.

10 MR. CARTER: Okay.

11 Q BY MR. SMITH: So is there a demonstrated
12 interconnection then between Birch Spring and the mine
13 because of what was occurring in the mine at this time
14 and the spike of flow out of Birch Spring?

15 A Yeah. Based on the records in their PHC,
16 they intercept the flows at 110 gallons a minute average,
17 probably higher to begin with, decreasing. The water
18 exceeded their capacity. It is discharged out the mine
19 portal. We have that in testimony, and at the same time
20 or slightly thereafter we get the spike flow in Birch
21 Springs.

22 Q So in your expert opinion does that
23 demonstrate, along with all the other things we've talked
24 about, an interconnection hydrologically between Birch
25 Spring and the mine?

1 A Yeah. It shows the fractured nature of the
2 system where you discharge out the portal into Dry Creek
3 and you get peak flows several weeks or less than a week
4 later in Birch Springs downgradient several thousand
5 feet.

6 Q I think that's all the questions I have.

7 MR. CARTER: Okay.

8 MR. MAYO: That raises a couple questions on
9 our end.

10 MR. CARTER: All right.

11

12 FURTHER EXAMINATION

13 BY MR. MAYO:

14 Q First is one I should have asked -- well,
15 let me get onto Birch Spring first. I'm going to make
16 sure I understand what you think is going on here. You
17 believe that the spike is due to surface discharge from
18 the mine?

19 A Yes.

20 Q Okay. Therefore is it reasonable to
21 conclude that whatever it is that's recharging Birch
22 Spring is hydrologically open to the surface?

23 A Yes.

24 Q How come Birch Spring has a tritium of 7.3
25 and doesn't have modern water in it?

1 A Because that sample I collected was last
2 year, and four years ago when you was on a declining
3 pattern from September '92 to '96.

4 Q Where's --

5 A We're talking about surface recharge
6 occurring in 1989.

7 Q Is that fracture still open?

8 A The fracture's still open.

9 Q To the surface.

10 A Now the fracture system associated with
11 Birch Springs, I also identified a trend associated with
12 that fracture in aerial photographs and also identified
13 that same fracture zone in subsidence associated with
14 Trail Canyon Mine in Dry Creek. So it's an interaction
15 of discharging water on the surface going into the
16 subsidence and interacting with any water in Trail
17 Canyon, some volume of water in there probably saturating
18 the system, saturating the fault and having some sort of
19 failure, or simply recharging the zone.

20 Q So if recharge were to get in that area
21 again, then we should see that in Birch Spring?

22 A If there was a significant quantity, yes. I
23 calculated the volume of water represented by this peak
24 and it's 63 acre feet of water. And I don't think annual
25 recharge of several inches intercepted the system. I

1 think it would be intercepted by the Trail Canyon Mine
2 and stored in there.

3 I think you have to have a significant
4 increase of storage volume in Trail Canyon in the
5 southeastern side of it where it subsided for this event
6 to occur.

7 Q Have you then calculated travel times from
8 where this transient event began to the discharge point
9 at Birch Spring?

10 A It's on the order of about two weeks.

11 Q Okay.

12 MR. CARTER: Let me see if I grasp this.
13 The significance here would be that, to cut right to the
14 chase, the Division shouldn't permit discharge of mine
15 water at this point because it's likely to get in Birch
16 Spring?

17 THE WITNESS: Out the portal in Dry Canyon.

18 MR. CARTER: Right. That's what I mean. So
19 that would seem to me to be a separate question from the
20 one which is, is this decline in the flow of Birch Spring
21 beginning in October of '87 caused by underground
22 mining?

23 THE WITNESS: Right.

24 MR. CARTER: Okay.

25 THE WITNESS: What it does show is that

1 definite mining will impact flow at the spring. This
2 particular event discharging out Dry Canyon increased the
3 flow, increased the TDS, and probably increased sulfate
4 values.

5 MR. CARTER: But that would have been true
6 if that water had come out of a truck.

7 THE WITNESS: Yes.

8 MR. CARTER: If people had driven trucks and
9 dumped the water in the same place?

10 THE WITNESS: Yes.

11 MR. CARTER: That would have been a trucking
12 impact, not a mining impact.

13 MR. APPEL: PHC; right? It's not your
14 problem.

15 MR. M. HANSEN: Unless the mine is trucking
16 the water out.

17 MR. SMITH: One other question. That also
18 demonstrates the connection between when the water is
19 taken out of the mine and then reduced flows in the Birch
20 Spring which are now about a third of what they were
21 before these events took place in the late 80's.

22 THE WITNESS: Yeah. It's actually -- I
23 think if you look at the valley preimpact to postimpact,
24 it's almost a 60-percent change in average flow. That's
25 demonstrated on Plate 7.

1 MR. MAYO: I have one more question that's
2 along the same lines.

3 Q It's your belief then -- I sound like an
4 attorney. I don't want to do that.

5 MR. M. HANSEN: Thanks a lot.

6 MR. MAYO: We all have to have our roles
7 here.

8 Q The decline in base flow in both Big Bear
9 and Birch Spring you're attributing to mine impacts, and
10 could you tell us specifically how it is that the mine
11 impacts are causing the decline in base flow?

12 A Yeah. First there is a definite decline in
13 flow because of declining precipitation. That's the
14 obvious thing here as well. But added upon that is the
15 fact that water's both intercepted and used or diverted
16 by mine discharge evaporation out the mine or consumed as
17 dust control in the coal, whatever.

18 Q Can I interrupt and get clarification on
19 that. The interception of water then would be -- how
20 would that interception of water occur?

21 A It occurs during mining, intercepting
22 fractures that flow either from the roof or the floor
23 into the mine generally.

24 Q Okay. So this would occur before -- never
25 mind. Go ahead.

1 A Plus the other, plus the other factor that
2 comes out of mining is the progressive nature of
3 subsidence that has shown up on all these other reports,
4 that you naturally depress the aquifers near the mine.
5 You dewater at a certain distance in front of the mine
6 and from the sides of the mine. It's just sort of like a
7 drain field in there.

8 And so if you're increasing the permeability
9 of the roof rocks and presumably to some extent the floor
10 rocks, you're either increasing the fractured nature or
11 you're closing the fracture depending on whether it's
12 tension or compression. And that will alter the
13 groundwater flow.

14 You may be shutting off groundwater flow
15 that was previously going to the mine. You're
16 intercepting it and diverting it, or you're increasing
17 the fractured nature and the water is going somewhere
18 else because it's got a better conduit.

19 Q I think this is my last question. And have
20 you been able to calculate the decline in base flow and
21 attribute X portion to mining activities and Y portion to
22 decrease in precipitation?

23 A No, we haven't. I haven't specifically
24 looked at what component precipitation may be versus
25 other components. What we did look at is some trends,

1 and if I've got an 11 percent change in precipitation and
2 I have changes of 68 to 47 percent in spring flow, to me
3 there's more than just a change in precipitation.

4 Q I need to ask one more question then. Is
5 there a linear relationship between the amount of
6 precipitation and the discharge out of the spring?

7 A No. It's not linear.

8 Q Do you know what that relationship would be?

9 A I don't. It's going to have some sort of
10 lag factor plus it's going to have some sort of factor of
11 recharge area, snow pack. There's a lot of factors in
12 it.

13 MR. CARTER: I was going to say and the
14 position of the spring in relation to the potentiometric
15 surface. Of course you map springs as being at the top,
16 but the bulge of the curve of the surface above the
17 spring tells you how much water you're going to get out
18 of it.

19 THE WITNESS: The hydrologic head on the
20 spring.

21 MR. CARTER: Yes. That's what I was after.
22 Thanks.

23 Q BY MR. C. HANSEN: The question I'd like to
24 ask is how large an area is affected by the subsidence?

25 A Generally in this area you're looking at an

1 angling of drop for the boundaries of mine, and you
2 probably have an impact anywhere from 200 to 1200 feet
3 above the mine.

4 Q How much of that area would be the recharge
5 area?

6 A Well, most of the area between Birch and Big
7 Bear Spring upgradient would be part of that subsidence
8 area.

9 Q You're not saying the recharge area for
10 Birch and Bear Springs and the recharge for the subsided
11 area above the Co-op Mine?

12 A I didn't follow. Say that again. Yeah.
13 No, I'm not saying that the recharge area for the springs
14 is just the mining area. No.

15 Q Okay.

16 A But that's part of the recharge area.

17 Q What percentage of the recharge area do you
18 think it is?

19 A Oh, 40, 50 percent maybe.

20 Q Really? That?

21 A Just a guess.

22 Q 50 percent of the recharge area --

23 A 40.

24 Q -- of those springs is above the Co-op Mine?

25 A I think so, based on if you look at the peak

1 flows from Big Bear, you've got peak flows occurring two
2 months after recharge with a small 2-to-3-month
3 duration. That indicates a relatively short travel
4 time. Those peak flows would not show up like that if
5 they had to travel a significant distance because a
6 larger regional groundwater system tends to level out any
7 peak flow.

8 Q And when you did your water budget for the
9 groundwater system, do you recall how much water you
10 calculated in going into the system from direct recharge
11 from the surface?

12 A Yeah. I looked at that recharge, I
13 collected evapotranspiration information that was
14 calculated using maximum temperatures from these weather
15 stations, Mammoth, Cottonwood, Hiawatha and Red
16 Pineridge; from the Utah climate certainly. They
17 calculated an average evapotranspiration based on those.

18 So I took the monthly evapotranspiration and
19 the total monthly precipitation, and during the periods
20 of snowmelt runoff you had excess I guess recharge
21 surface runoff over evapotranspiration, and then the
22 reverse is true during the late spring, summer, fall
23 months where you had higher ET versus precipitation.
24 That's consistent with the idea that most of the recharge
25 is from snowmelt.

1 Plus I contacted the snow survey division
2 that calculates water quantities based on snowpack, and
3 they use sort of an average of 15 percent runoff for
4 their models. So if you subtract out evapotranspiration
5 and 15 percent surface runoff from this area, you come up
6 with about an average of 11 percent recharge during the
7 spring runoff.

8 Q So 11 percent infiltrating the system?

9 A Infiltrating the system.

10 MR. MAYO: And you're going to share those
11 calculations with us and the method you used for
12 calculating the evapotranspiration.

13 THE WITNESS: It uses max and minimum
14 temperature which relates to the amount of solar
15 radiation on any given day, which is the primary driver
16 for evapotranspiration.

17 MR. CARTER: I had a question on
18 fracturing. I think the fracturing effects of subsidence
19 are fairly well understood and they're usually projected
20 in the mined area up. You testified as to floor
21 heaving. Do you have any opinion as to how far below a
22 mined area fracturing resulting from not loading might
23 extend?

24 THE WITNESS: They're -- I talked with a few
25 engineers, and there's really not -- I guess you could

1 run a few models, but they really didn't know. But when
2 I worked at the Star Point, we had a couple of monitoring
3 wells that were located in the lower Black Hawk in the
4 Star Point, and as the longwalled panels approached it,
5 we had a significant decrease in groundwater levels on
6 the order of 20, 30 feet. And as soon as the longwall
7 was moved, the water levels gradually recovered to some
8 lower level. They didn't recover fully, but they
9 recovered to some level.

10 The decrease in fracturing and the lowering
11 suggests that tension exists in the floor rocks and
12 you're opening up the fractures, to some, to some
13 degree.

14 Now that was with the longwall. Obviously
15 you're not going to get that amount of effect on a room
16 and pillar, but you're going to get some because you are
17 relieving pressure. The rocks are going to rebound.
18 What this is I don't know.

19 MR. CARTER: Okay.

20 THE WITNESS: There will be some. To what
21 degree, I don't know.

22 MR. APPEL: I need to raise a couple
23 procedural issues. First is we could probably stop with
24 him right now. I'm wondering, Mark, if you anticipate
25 putting on any witnesses of your own.

1 MR. M. HANSEN: How much time do you
2 anticipate taking in the afternoon?

3 MR. APPEL: Well, that depends on what
4 you're going to put on. What witnesses? Let's take one
5 question at a time.

6 MR. CARTER: Let me ask. Do you have more
7 witnesses that you intend to present in your case in
8 chief as it were?

9 MR. APPEL: We have one more witness.

10 MR. SMITH: Yeah. We have one that we need
11 to put on out of order. He won't be here till the middle
12 of the afternoon because of his work schedule.

13 MR. CARTER: How long do you think that
14 testimony might last?

15 MR. SMITH: 15 minutes to a half hour. Very
16 brief.

17 MR. CARTER: All right. So we're
18 essentially done with what you initially intended to
19 present, so we're ready to move to Co-op's response.

20 MR. APPEL: I'm trying to figure out who
21 Mr. Hansen intends to call and what the sum of their
22 testimony will be.

23 MR. M. HANSEN: At this point it's obvious
24 that we're going to have to come back another day. My
25 biggest problem is that Rich White notified us shortly

1 before, not in time to reschedule, that he would not be
2 able to be here today. He is one of the experts.

3 In addition, we are still waiting to get
4 back some of the lab tests that we were looking for, and
5 we've been told this morning that certain information
6 would be provided to us, and obviously we don't have that
7 yet. What I would like to do would be to try to put on
8 our whole case in one day, and therefore reschedule our
9 case for another day and not call any witnesses this
10 afternoon.

11 MR. APPEL: Well, let me make a statement
12 then. There have been some requests for discovery, what
13 I would consider for discovery, which they are not
14 entitled to in an informal proceeding. I want to get to
15 the bottom of this, but I don't think that only one side
16 should be able to get to the bottom of this.

17 So I would be happy to provide the
18 information requested by the various voices at that
19 table, but before they put their testimony on, we want to
20 see what they're going to say so we can provide adequate
21 rebuttal. So if we're going to be another day, they have
22 to show us theirs too.

23 MR. M. HANSEN: Let me answer. What we have
24 asked for, and what we have been told would be provided
25 is certain raw data and certain calculations. We neither

1 asked for nor received the total sum of what their
2 testimony was going to be, and I believe that we would be
3 happy to furnish whatever additional raw data and the
4 calculations behind that raw data just as we have
5 requested and they have considerably reproduced, if that
6 would be acceptable.

7 MR. APPEL: And we have given you our
8 exhibits beforehand as well. We want to have a fully
9 prepared rebuttal and not continue this wonderful saga
10 forever down the road.

11 MR. SMITH: And I'd like to point out, I
12 have a real difficulty with Co-op saying they don't want
13 to put on any of their case this afternoon. They have at
14 least two experts sitting at the table that have been
15 here. One of them was here the last time. One of them I
16 believe works for the same firm as Mr. White, you know.

17 I think this is just simply a tactic on
18 Co-op's part to listen to all of our case, be able to
19 take it all back, then sit down and prepare their whole
20 case. And I think just we're here, we've traveled. I
21 have to say this is extremely expensive and difficult for
22 my client. It's a very small water company, both of
23 them.

24 And to just keep prolonging this because
25 they say, well, geez, we're sorry, we're not ready to go

1 today I think is really unfair and borders on being
2 sanctionable, to be honest with you, Jim. They have some
3 of their case, and I think we shouldn't waste a half a
4 day. It's only 12:15, you know. They should be required
5 to put on whatever they've got of their case and get it
6 started.

7 MR. CARTER: Let me ponder this for a
8 minute. And I'll do that out loud. In the usual
9 circumstance with an informal conference it's fairly easy
10 to get all of the information in because -- in a day
11 because it's not highly technical.

12 And I think going into this, given that this
13 is a remand from the Board, a circumstance in which the
14 Co-op made its case to the Division, the Division made
15 its determination, the Protestants appealed that to the
16 board and it's been returned to the Division for informal
17 proceedings, I think I feel that I've been instructed by
18 the Board to make sure that no stone is unturned.

19 So I'm -- the "sideboards" for me are to
20 make sure that I have considered everything relevant so
21 that in the event the Board hears this matter again we
22 won't have a circumstance with the Board's hearing
23 anything new. They can reexamine the findings that we
24 make if either of the parties are unsatisfied with the
25 conclusions of law, but we won't have new evidence or new

1 testimony.

2 So on the one hand I want to make sure we
3 have ample opportunity for every piece of relevant
4 argument or evidence to come in. On the other hand I'm
5 sensitive to your concern that we not unduly prolong this
6 process.

7 I suppose I'd ask is there information that
8 you would be prepared to present today that wouldn't be,
9 that wouldn't be prejudicial for you to do that? I would
10 encourage you to do that. I anticipate, though, we are
11 going to have to reschedule. I mean that we'll need to
12 have yet another day because I think there are some folks
13 who are neither Co-op or the Protestants who are
14 interested in putting on some testimony.

15 MR. M. HANSEN: I would state that first
16 this proceeding has been delayed numerous times, none of
17 which were at Co-op's request. And those delays have
18 resulted in us being here nearly a year after the
19 informal conference would normally have been held.

20 That entire year was not Co-op Mine's
21 responsibility. It wasn't anything we did that resulted
22 in that delay. And I believe at least two of those
23 delays were caused by the water users. I don't think
24 they're in much of a position to complain about a further
25 delay on that point.

1 In addition, even assuming that we went
2 forward this afternoon, even assuming I was fully
3 prepared, our case would be long enough that there's no
4 way we could complete it in the remainder of today, and
5 we would have to come back in any event. So it's not a
6 question of us having an unnecessary delay because it
7 would be continued in any event.

8 Finally, in the afternoon, after the
9 completion of the water user's case in chief I intend to
10 make a motion to overrule their objections summarily.
11 And I believe the argument on that motion may take up at
12 least an hour or so of the afternoon which would even
13 further cut into the time that we would have available.

14 MR. CARTER: I'll tell you how I'm going to
15 handle that, as I do with all informal conferences.
16 Again this is quasi-formal because it's on remand from
17 the Board. I'm going to take all those arguments and
18 everything that's been presented under advisement, and
19 I'm going to avail myself of my own technical experts.

20 What I plan to do is to pose a series of
21 questions to my staff to say I'm -- as I said before,
22 I've got enough knowledge to be a little dangerous.
23 Maybe a little knowledge and I'm real dangerous. So I
24 will be consulting with my staff folks.

25 The question I'll be taking to them is given

1 all this information and given these arguments, should we
2 alter the findings that have been reached and their
3 recommendations. So it's not like you're arguing your
4 case just to a judge, but you're arguing your case again
5 to the Division, and I'm the input.

6 MR. SMITH: You're the director.

7 MR. CARTER: And I'll be asking my assistant
8 AGs for guidance with regard to I anticipate your
9 argument's going to have to do with threshold questions.

10 MR. M. HANSEN: The argument and the motion
11 will be based on my position and the mine's position that
12 the water users have not met their initial burden and
13 there will therefore be no need for us to put on any
14 additional evidence.

15 And if we are allowed to put on our entire
16 case at a different date, you would have enough time to
17 make a ruling on that decision. And if your ruling was
18 in our favor, that would curtail the need for the
19 additional day entirely. So rather than cause delay it
20 would resolve the matter even quicker.

21 MR. CARTER: It would -- go ahead.

22 MR. APPEL: It seems we have a practical
23 problem then. I imagine our last witness -- it was our
24 understanding that we were going to be back. Then I
25 would -- I think that's the end of what I have for

1 Mr. Nielsen. We have a gap in time before our final
2 witness can appear.

3 We'd anticipated, since this was duly
4 noticed, that we would be hearing their testimony. It's
5 not out of the ordinary because of scheduling conflicts
6 to take a witness out of order. We would accord them the
7 same privilege.

8 So what I would request of the same,
9 Director, is they start calling their witnesses during
10 the lunch break, we take ours and fill this day, since
11 we're here. And if Mr. Hansen at the end wants to make
12 his hour-long or whatever it takes argument, then that
13 will be on the record.

14 MR. CARTER: You're planning to make your
15 objection prior to putting on a case?

16 MR. M. HANSEN: That is my intention, yes.

17 MR. CARTER: Is that my understanding? And
18 are you prepared to do that this afternoon, to make the
19 argument to --

20 MR. M. HANSEN: Make my motion, to make my
21 argument, yes.

22 MR. APPEL: But you'll need to hear the
23 testimony of my out-of-order witness.

24 MR. CARTER: In order to decide.

25 MR. APPEL: It will bear greatly. Part

1 of -- if what his arguments are what I think they are,
2 then it will be useful to you. And you can hear
3 everything then and then sort it out among ourselves.

4 MR. M. HANSEN: Can we know who this witness
5 is?

6 MR. APPEL: It's no secret. It's Mr. Galen
7 Atwood, the very worker charged to us to bring.

8 MR. SMITH: He would be here but he can't
9 get off work from his job.

10 MR. CARTER: His testimony would be as to
11 things he observed underground in the Co-op Mine?

12 MR. SMITH: During the period of the time he
13 worked for the Co-op Mine.

14 MR. CARTER: So this is going to be purely
15 fact. You're not holding him as a hydrology witness.

16 MR. SMITH: He's no expert. We'll ask him
17 to give no opinion. Simply just to tell us things he
18 observed.

19 MR. CARTER: Not to prolong this. People
20 are probably itching for a break. Especially our
21 reporter. It would seem to me that his testimony is
22 going to go to things -- let me back up.

23 As you observed, I'm not going to be
24 considering events that don't relate to hydrologic
25 impacts of mining. I mean that's what we're here to

1 figure out, what are the hydrological impacts of mining,
2 if any, and are they the kind of impacts that would
3 mandate the Division to do something other than what it's
4 done so far, which is to approve the mining proceed. And
5 to the extent that his testimony goes to that, it's
6 completely relevant.

7 But I think there are elements of
8 discharging, there are questions was there a permit for
9 this. I think that's outside the scope of what the
10 Division did or didn't do and whether it was or wasn't a
11 violation and whether it was allowable or not go beyond
12 what we're trying to figure out here, which is what are
13 the hydrological impacts.

14 So I'm not saying he should not testify, but
15 I'm saying that's the part that would be relevant.

16 MR. SMITH: That's right, and that's what
17 we'll limit it to. As I recall, when Mr. Nielsen was
18 testifying as to things that Mr. Atwood had told him
19 which he was using as a basis of his testimony, which is
20 actually perfectly proper because experts can rely on
21 nonadmissible things to come to their conclusion.

22 MR. CARTER: Informal. Informal. Keep this
23 in mind.

24 MR. SMITH: You can do that even in a normal
25 court proceeding. But an objection arose from the Co-op,

1 and so rather than have to deal with the objection, we'll
2 just put on the fact witness who can sit here and tell
3 you what he saw as far as that, and we'll limit it.
4 That's why I say I don't anticipate taking very much time
5 with him.

6 MR. CARTER: I'm sorry, when do we expect
7 him?

8 MR. SMITH: I expect him here by 3:00
9 o'clock. But, you know, I would just like to join
10 Mr. Appel saying let's use up this day. What I'm afraid
11 is then we'll spill into a --

12 MR. APPEL: Fourth day.

13 MR. SMITH: And then maybe a fifth day. If
14 we just keep cutting things short, we'll never get this
15 done. I think we should take the full time. If they
16 have any fact witnesses, anyone here they intend to call,
17 they should call him. And if they don't call them today,
18 I think they could be precluded from calling them at a
19 later time, just because if they're here we should get as
20 much done as we can. You've traveled, we've traveled
21 from Salt Lake, people have taken time out of their
22 schedules. Let's make a full day out of it.

23 MR. CARTER: I think lunch is going to be a
24 good time for me to ponder this. I am inclined, I think
25 if you have a motion that is primarily to your putting on

1 rebuttal or argument or anything else, likely it would be
2 productive to hear that today. I'm disinclined to wait
3 until 3:00 o'clock and just sort of hang around and wait
4 in order for you to make that motion. I think maybe we
5 ought to break and let me think about this about how to
6 proceed.

7 Again my objective here is to get all of the
8 information in. The order of presentation is not
9 particularly critical. I mean it's not as though you're
10 presenting a case in chief and then resting and you're
11 precluded from calling anyone else.

12 Likewise I don't want to put the Co-op folks
13 to the burden of putting on a case, specifically if they
14 believe that if they have legal arguments to make or they
15 believe that nothing's been introduced so far that
16 changes anything. I believe they ought to be able to
17 make that argument.

18 MR. SMITH: Just like Mr. Ed Clyde. He
19 really believed the other side didn't make their case so
20 he didn't put on any evidence and let the judge make his
21 ruling.

22 MR. APPEL: Which is essentially what
23 Mr. Hansen suggested we do.

24 MR. M. HANSEN: Let me make a suggestion. I
25 believe I know what Mr. Atwood is going to be testifying

1 to. If we may, when we resume, I can bring my motion at
2 that time. And we'll make the argument on the motion,
3 and that should take up a good part of the time between
4 the time we've already determined, 3:00 o'clock, and then
5 allow Mr. Atwood to testify. And if his testimony
6 affects any of the arguments that I have made, we could
7 modify our arguments accordingly.

8 In other words, I'm saying let me make the
9 motion, both sides can make the argument before we hear
10 Mr. Atwood's testimony, and that would save the waste of
11 that time.

12 MR. CARTER: Okay. That makes sense to me.

13 MR. SMITH: I'll be surprised if I have more
14 than ten minutes of response. I think an hour to argue
15 that motion is an extraordinarily long time, but let's
16 hear it.

17 MR. CARTER: Why don't we proceed and we'll
18 see where we are and see whether Mr. Atwood's here and
19 decide what we'll do next. Again everybody is here, I
20 know all of these folks have got other work to do. This
21 is not what you spend your whole lives, waiting for
22 informal conferences to listen to.

23 I would try to make it as economical as
24 possible, although the overriding objective here is
25 taking anything anyone knows and suspects or is concerned

1 about into consideration of the Division so that when we
2 make a determination about what we're going to do no one
3 can say, well, they left a number of stones unturned. I
4 want to make sure we turn them all over.

5 So with that, is there a rush to get back?
6 Should we say 1:30 or should we say a quarter after?

7 MR. M. HANSEN: Well, it's already 12:30.

8 MR. CARTER: Yeah. Where does one go for
9 lunch? Is it close or do we have to drive to Huntington
10 or down to Emery?

11 MR. M. HANSEN: I would suggest 2:00
12 o'clock.

13 MR. CARTER: You would?

14 MR. SMITH: I think 1:30 is fine. An hour
15 for lunch.

16 MR. CARTER: I'm inclined to -- I'm sorry,
17 if there's a reason to go beyond 1:30, tell me what that
18 would be.

19 MR. M. HANSEN: The question is if argument
20 is not going to take more than one hour, then we're going
21 to be waiting for Mr. Atwood's appearance. Do we want to
22 rush through lunch and then have a half hour twiddling
23 our thumbs?

24 MR. SMITH: Well, Mr. Hansen can call his
25 witnesses. Call his witnesses. Obviously he doesn't

1 want to call his witnesses.

2 MR. CARTER: Let's reconvene at 1:30, and we
3 will start there and see where we are when we get through
4 the argument.

5 (Lunch recess taken from 12:30 p.m. to
6 1:30 p.m.)

7 MR. CARTER: Let's turn to Mr. Hansen to
8 proceed however he plans to at this point.

9 MR. M. HANSEN: You are all through with
10 Mr. Nielsen; correct?

11 MR. MAYO: I had a couple questions I wanted
12 to ask before we proceeded, a couple questions I wanted
13 to ask you, Peter.

14 MR. CARTER: Okay. Shall we wait for a
15 moment and you can do that. That would be fine.

16 MR. APPEL: Since we're waiting, maybe I can
17 ask a question. I don't -- and maybe Mr. Hansen can
18 answer that. I don't see any procedure to bring a motion
19 to dismiss. I think the rules of the Division, and I'm
20 looking at specifically R6.45-300-131.100 says:

21 "The Division shall review the
22 application for a permit, permit change or
23 permit renewal, written comments and
24 objections submitted and records of any
25 informal conference or hearing held on the

1 application, and issue a written decision
2 within a reasonable time set by the
3 Division, either granting, requiring a
4 modification of or denying the
5 application."

6 And then it goes on. But I guess my point
7 is, as I say, the procedures that are set forth in the
8 rules, you listen to all -- you listen to all the
9 evidence, look at all the comments, you look at the
10 permit, you make a decision, and I think it's just up to
11 the permit holder who is seeking renewal if they want to
12 present any evidence.

13 If they choose not to, you can close the
14 proceeding right now and go home and make your decision.
15 If they chose to do that you can go ahead. But I don't
16 see any procedure that's outlined for any motion to
17 dismiss the objection. We've either met or not met our
18 burden. You'll have to make that decision.

19 I think they have their choice as far as
20 what they want to put on in this, any kind of evidence in
21 this informal conference they choose to. That's their
22 decision. If we haven't met our burden, they're free to
23 say objectors haven't met their burden; so we're just
24 going to stand on the record as it's been created up to
25 this day.

1 MR. M. HANSEN: The water users have spoken
2 about the length of time it's taken to get here, the cost
3 it's taken to get to this point. The rules state that an
4 interested party, and it defines who is entitled to bring
5 an objection, may make an objection to an application for
6 permit renewal, and they're entitled to an informal
7 conference.

8 The rules further state that at that
9 informal conference, the party making the objection has
10 the burden of proof to establish their objection. If
11 they don't meet that burden of proof, then there is no
12 threshold requirement for the applicant to come back to
13 respond at all.

14 And I would submit that the Division
15 certainly has the power to decide after the water users
16 have submitted their entire case to the Division to make
17 a ruling whether or not that is sufficient evidence to
18 require us to even go forward. Because if it's not
19 sufficient at that point to convince the Division to
20 change its mind, then the Division can so rule, and we
21 can all go home.

22 If the Division is of the mind that the
23 water users have met that initial burden, then it would
24 become our obligation to go forward and rebut that
25 burden.

1 MR. APPEL: Let me. There are a couple ways
2 to deal with this. I guess what Mr. Hansen's asking you
3 to do is after his argument call a halt to the whole
4 thing, presumably I suppose after we've had our final
5 witness testify. But it overlooks several things.

6 I think first of all I agree with Mr. Smith
7 there's no procedures that necessarily allow you to do
8 such a thing. And second of all, quite a bit of good
9 information can come out on cross-examination of other
10 side's witnesses.

11 I read what Mr. Smith said as requiring you
12 to make your decision based on the proceeding, which was
13 the entire proceeding, and contemplates our side and
14 their side. And much as they have asked many questions
15 of our witness, we intend to ask as many if not more of
16 theirs. And what we're talking about there is a document
17 that's in existence --

18 MR. CARTER: Let me give you my reading on
19 this. It may be that my need for advice, legal and
20 technical both, is going to be more the determining
21 factor than anything. But my understanding of this
22 proceeding was to take evidence and argument from the
23 Protestants to determine whether or not, and I think
24 everyone's characterized this correctly. I see the
25 Protestants here as having a burden of proof.

1 MR. APPEL: The objectors.

2 MR. CARTER: For lack of a better
3 description. And I think, it seems to me at any rate
4 that the Permittee has the right to argue that the
5 objectors have not met that burden; and that if that
6 argument is made, it seems to me then that I as division
7 director will have to decide.

8 And I'm tending to agree with Mr. Hansen
9 that it may be that if the Division decides that burden
10 has not been met, there is no need for them to do
11 anything.

12 Just as you said, Mr. Smith, they would just
13 rest on the -- on that determination. And the facts that
14 the Division has found already would remain the facts
15 that govern our permitting decision.

16 But in order for me to make that decision,
17 I'm going to have to evaluate, and I'm going to have to
18 get some technical input from my staff on the technical
19 information that we've received.

20 I don't think this is a court proceeding in
21 which there's an opportunity to cross-examine witnesses.
22 I'm allowing this for the purposes of clarification and
23 the benefit of everyone involved. I'm allowing people to
24 ask questions and ask technical questions, but I see them
25 as clarifying questions so that everyone has a clear

1 understanding of what the technical testimony is.

2 But if Mr. Hansen plans to make an argument,
3 and I'm anticipating that he's going to, that the burden
4 of proof hasn't been met, I'm going to have to get some
5 advice from my advisers in order to make that threshold
6 determination.

7 And if the burden has been met, then I think
8 he's correct that I would say, we believe the Objectors
9 have raised some new points, have given us a sufficient
10 quantum of evidence that we need to change the factual
11 findings we've made about what's going on here
12 hydrologically. And if we do that I think then that
13 gives them an opportunity to say we have rebutting -- we
14 have a rebuttal to that.

15 But if I don't -- I mean I'm open to
16 argument here, but it seems to me there really is --
17 there's a protest of a five-year permit renewal; the
18 presumption is that the renewal should go forward. The
19 Permittee's entitled to that, absent a showing that we've
20 made some fundamental mistake, or there's no evidence
21 that would tend to undermine one of the necessary
22 findings to issue a permit.

23 And so what we've done for a day and a half
24 is to take evidence and argument that would tend to
25 undermine the findings that the Division has made, that

1 there's no adverse hydrologic impact of this mining on
2 Big Bear and Birch Spring.

3 MR. APPEL: Just so my record's clear, Jim,
4 my reading of this rule, and this is the rules that your
5 Division's created, and I love to tell people that you
6 can make all the rules you want, but once you make them
7 you've got to follow them, is my reading of the rules is
8 you can't make any rulings until the close of this
9 informal hearing.

10 And so if the Permittee thinks that we
11 haven't met our burden and they want to close it, they
12 can just say we have no evidence, and the hearing can be
13 closed. But I don't see this as a two-stepped approach
14 where we put on our evidence and then you have to make a
15 ruling and then reopen the hearing. The rule doesn't
16 contemplate that. The rule contemplates that a written
17 decision comes out after the informal conference is over,
18 and the record's closed.

19 So I think we're -- I think what we're
20 doing is wasting time in having arguments about whether
21 we've met our burden. Obviously you'll have to make that
22 determination at the close of this hearing. But this
23 isn't the proper time to make that determination.
24 There's no procedure here for well, after the Objector's
25 case, and I think, you know, they're wanting to change

1 the procedures from those that are outlined in the rules,
2 and I think we've just got to follow the rules.

3 Obviously we have to meet our burden. But
4 to have a two-step process where we, you know, you hear
5 our evidence and stop and decide whether we've met our
6 burden, I think that just delays things, and that's not
7 contemplated by the rulings.

8 The rules contemplate having the informal
9 conference and then you issuing a written ruling.

10 MR. CARTER: After it's been closed.

11 MR. SMITH: After it's been closed.

12 MR. CARTER: Go ahead, Jeff.

13 MR. APPEL: Just one more thing to elaborate
14 on what Mr. Smith said. What I heard you say, Mr.
15 Carter, is that Mr. Hansen might make his argument and he
16 might be able to win based upon that argument. And I
17 don't think that that's correct. I think we could also
18 win, which is what Mr. Smith is getting to, to close the
19 evidence at that point and we can win without hearing
20 their testimony.

21 And I don't know that that approach, which
22 is analogous in my mind to a directed verdict in court --
23 we're not bound by the rules of civil procedure at this
24 informal stage, clearly, and there's nothing in here that
25 suggests he can have a summary disposition based upon the

1 analog of a direct verdict. So I think that without
2 hearing the entire evidence, to suggest that only he can
3 prevail wouldn't be fair to us.

4 MR. CARTER: This may be explained here.
5 Something just -- let me just offer this. I think I
6 could. I think I could make a summary one-line
7 disposition of this whole matter by saying I've listened
8 to everything, I went up on Gentry Mountain, I looked at
9 everything, I don't think -- I didn't see anything here
10 that would cause me to change my mind, the end.

11 Now I don't think that would be a very good
12 decision for the Division to make for a number of
13 reasons. But one of the obvious ones would be the Court,
14 the Board, or whoever looked at it, assuming somebody
15 did, would have no way of knowing what weight we gave
16 anything or whether we even listened to you.

17 So I am anticipating that the decision, that
18 the Division here is going to address in pretty specific
19 form all of the issues that are being raised here in an
20 attempt to either resolve the matter so that everyone can
21 live with whatever the outcome is, or to create a
22 sufficiently detailed record that if the Board sees it, I
23 mean there won't be a whole lot of new information that
24 needs to be brought to the Board for them to decide.

25 I think the sticky thing here is how to

1 proceed. I mean what is the procedure at this point?
2 And whether if Mr. Hansen argues that you've not met your
3 burden and then asks for a Division decision, that I then
4 have to close the informal conference and if I decide
5 that you did meet your burden, there would be no
6 opportunity on the part of the Permittee to rebut.

7 So I don't want to close this proceeding
8 until we've gotten everything in that's relevant and
9 material, on the one hand. On the other hand, I think
10 given that it did take a day and a half for the objectors
11 to present their full case, including a field trip, I
12 don't think it was out of my expectation at least that it
13 would take perhaps a day for Co-op to put on whatever
14 factual information it wanted to. So I was pretty much
15 thinking that we weren't going to be able to finish
16 today; that we would have to have one more day.

17 But I was telling myself that that was
18 absolutely going to be it. And as it got to be 3:00
19 o'clock on the third day I'd say you'd better talk faster
20 because we're going to leave at 5:00 or 5:30 and that's
21 going to be it.

22 It seems to me that, again because this is
23 informal, and I don't think it's prejudicial to anybody
24 here, I think I'm going to allow Mr. Hansen to make the
25 arguments that he wants to make with regard to what we

1 ought to do or what we can do or can't do. And if I feel
2 a need for some consultation, I may just call a brief
3 recess and go make a phone call, see if I can get in
4 touch with one or more of my assistant AGs and say,
5 here's where we are, here's what I'm being told to do,
6 and do you think I have to close it in order to decide
7 the burden issue? Do you think I have to hold it open
8 and make the recommendation?

9 MR. APPEL: Let me make one last
10 recommendation because our understanding of the
11 proceeding, based on conversations with your lawyers, are
12 that you prefer to have things submitted in writing. In
13 the past what we've done is submitted things in writing
14 at some time afterward. You would be short-circuiting
15 that process. We intend to give you a report, with
16 graphs, in writing, after this is over which you would
17 benefit from.

18 I guess to cut to the quick here which we've
19 been trying to do here, I don't see you granting
20 Mr. Hansen. I think it's a waste of time on that basis
21 because the sense of this proceeding that I have and the
22 way the Division has conducted it is that you're going to
23 want to sit down and look at everything, and that
24 includes written submissions after the fact.

25 Right now you'd be looking at what's in the

1 PHC and what we've given you.

2 MR. CARTER: As a practical matter that's
3 right. But I think too, what I do or what the Division
4 should do after it has done that, whether the Division's
5 orders should say the burden has been met or whether we
6 don't even use the word "burden" and do a complete
7 reanalysis, I think it's fair to permit the Permittee to
8 articulate their view of this or what's happened to date.

9 MR. APPEL: Let's do it.

10 MR. M. HANSEN: I should point out briefly,
11 just talking about the rules that are applicable, the
12 rules say that an objector can have an informal
13 conference. The rules are pretty much completely silent
14 as to what that informal conference is to consist of. It
15 doesn't say what you can do or what you can't do.

16 It doesn't say whether the conference should
17 be on the record or off the record. It doesn't say
18 whether the attorneys are entitled to cross-examine or
19 the whole world is entitled to cross-examine matters. It
20 doesn't say that the Division can or cannot rule
21 summarily. It also does not say whether an objector or
22 another party at the conclusion of oral presentation has
23 a right to submit written briefings.

24 And the water users are talking out of both
25 sides of their hat on that. They're saying the rules

1 don't contemplate summary rules so you can't have one.
2 But the rules also don't contemplate written post
3 conference briefs, but they intend to file one.

4 I would submit that the rules state that you
5 have an informal conference and it's basically left to
6 the discretion of the Division as to what is going to go
7 on in that conference.

8 MR. CARTER: That's been my reading since
9 I've been doing these. And all of them to date have been
10 much less formal. So this we're plowing new ground here.

11 MR. SMITH: That's right. I'd just also
12 like to point out that same rule does provide for
13 application of written comments. So I don't think we're
14 asking for something that's not contemplated by the
15 rules. The rules say written comments and records of the
16 informal conference are two things that you need to
17 consider in making your decision.

18 MR. CARTER: At this point here's what we'll
19 do. At this point you've got one additional witness that
20 you plan to have testify. I understood Mr. Hansen to say
21 he doesn't have a problem making the argument that he'd
22 like to make prior to putting on a case, if that's what
23 we're going to call it. So let's do that. And when the
24 witness testifies, if you believe that changes anything
25 that you've said or argued to me, then you'll be able to

1 do that.

2 I think depending upon what your argument
3 is, I think I'm going to have to take a few minutes to
4 figure out how to proceed, especially if it's requesting
5 that I take a -- make a decision here today. So let's
6 do that. Let's have you make your argument.

7 MR. MAYO: Could I ask you before you start
8 that, could I ask you a couple clarifying questions?

9 MR. CARTER: If Mr. Hansen has no objection,
10 that would be fine.

11 MR. M. HANSEN: I have no objections.

12 MR. MAYO: I just want to make sure I
13 clearly understand the impacts that you're suggesting
14 here. If you could clarify for me on a spring by spring
15 basis, we'll do Big Bear and then Birch Spring. What are
16 the specific impacts and the mechanisms of those impacts
17 which have occurred in the past to Big Bear Spring as due
18 to mining? Be as specific as you can.

19 MR. CARTER: I think that's a fair
20 question. Basically asking for a summary of your
21 testimony with regard to how mining has affected Big Bear
22 Spring.

23 THE WITNESS: I would suggest that mining
24 has reduced at least the annual recharge component and
25 possibly the base flow component of both Big Bear and

1 Birch Springs due to the interception of water,
2 interception of the potentiometric surface, dewatering by
3 discharging or dealing the water in other mine usages.
4 They've intercepted water that would normally discharge
5 at the springs, downgrading it, and it's being diverted
6 for use, being pumped out.

7 MR. MAYO: And the --

8 THE WITNESS: Above and beyond five acre
9 feet, which is mentioned in their permit as replacement
10 water.

11 MR. MAYO: And the future impact do you
12 expect to Big Bear Spring and the mechanism for that.

13 THE WITNESS: I suspect looking at the
14 future, if when mining stops portions of the mine are
15 going to flood. Water naturally flows to the south and
16 southeast. I suspect some of those areas are going to
17 reflood again, and it's more than likely you're going to
18 see a head, a hydrologic head bumped upgradient from Big
19 Bear Springs.

20 You may see increases in flow again,
21 increases in TDS, sulfates. You may even see icicles
22 form on the outcrop again because it's become saturated
23 because the higher hydrology in the abandoned section of
24 the mine, as well as you may see discharge beginning
25 along the outcrop in Bear Canyon because that's also

1 downgradient. And if it builds up with water, it's going
2 to start seeping to the surface.

3 MR. MAYO: And the specific impacts in the
4 mechanics to Birch Spring and how they may differ from
5 those to Big Bear Spring?

6 THE WITNESS: I think the differences to Big
7 Bear Spring is that you're diverting water away from the
8 western side of the mine and the northern part of the
9 mine that normally would be recharging the fracture zone
10 in that area. So you're essentially moving it away from
11 a recharge area for the spring and putting it into Bear
12 Canyon or the lower Bear Canyon here in Huntington
13 Canyon.

14 MR. MAYO: Okay.

15 MR. CARTER: Thank you. Mr. Hansen.

16 MR. M. HANSEN: Co-op Mining Company moves
17 for a decision to overrule the water user's objection and
18 deny all the relief water users seek and to affirm their
19 prior decision to approve the renewal of Co-op's mining
20 permit as it exists.

21 The basis for this motion is this: The
22 water users claim to be parties with an interest that is
23 or may be adversely affected by the mining activity and
24 on that basis brought their objection and requested an
25 informal conference. They are entitled to have their

1 informal conference on their objections. They are
2 entitled to present the evidence that they claim supports
3 their objections in presenting their case. They have the
4 legal obligation to come forward with evidence, and they
5 have the legal burden of proof to establish by a
6 preponderance of the evidence that what they are claiming
7 is the case.

8 The basis of this motion is that the water
9 users have had their shot at the informal conference.
10 They have presented their evidence, and their evidence
11 taken as a whole, compared to the evidence that's already
12 in the record and the information available to the
13 Division and relied on by the Division in making their
14 initial determination, does not meet their burden, burden
15 of proof, is not sufficient to justify a Division order
16 to reverse their decision.

17 In order to rule on this motion, we need to
18 review what the evidence has been in the record and what
19 the evidence has been that the water users have offered
20 at this hearing. The bulk of the time that I anticipate
21 on the motion is the argument on the evidence.

22 The water users first called Darrel
23 Leamaster as a witness. He testified somewhat about the
24 history of the springs; I believe Big Bear Spring in
25 particular. All of the information that he testified to,

1 with one exception, was the same information that was
2 already in the record, was already submitted to the
3 Division, either at the time of Co-op Mine's last permit
4 renewal or at the time that the Division and subsequently
5 the Board decided to approve Co-op Mine's application for
6 a significant permit revision to permit mining the tank
7 seam.

8 So with one exception, all of the evidence
9 that Mr. Leamaster offered was already in the record.
10 None of that information should be sufficient to justify
11 the Board changing its mind because it was already before
12 the Board when it made its decision.

13 The one exception is Mr. Leamaster's
14 testimony that Big Bear now is flowing at approximately
15 148 gallons per minute. He testified that in May of 1995
16 that that water flow got as low as 76 gallons per
17 minute. And he testified before the board in October of
18 1994 that at that time that the water flow level in Big
19 Bear Spring was I believe 118 gallons per minute.

20 In other words, Mr. Leamaster's testimony on
21 the water flow out of Big Bear Spring has established
22 that the water level has increased. It has increased 25
23 percent over what it was two years ago this same season.
24 It's doubled over what it was this summer. And all the
25 time the water was continuing to dewater in the mine.

1 I would submit that Mr. Leamaster's evidence
2 not only does not go anywhere towards meeting the water
3 user's burden of proof, it actually undermines their case
4 and decreases their likelihood of their being able to
5 have met their burden of proof.

6 The next witness that the water users called
7 is Mr. Jack Stoyanoff. I have looked through his entire
8 testimony, and I don't see anything in his entire
9 testimony that wasn't already before the board. So
10 nothing that Mr. Stoyanoff said was anything other than
11 cumulative of evidence that the Division already had.

12 The next witness that the water users called
13 was Mr. Kay Jensen. He testified only to matters that
14 were also before the Division at the time, and his
15 testimony had very little relevance to what was going on
16 in this case. It had no relevance to what the impact of
17 mining would have in the case. Again his testimony does
18 nothing to meet and satisfy the water user's burden of
19 proof.

20 The bulk of the water users' evidence in
21 this informal conference was given by Mr. Peter Nielsen,
22 and we need to examine some of his testimony fairly
23 closely. I would state in beginning that Mr. Nielsen's
24 expert opinions are exactly the same expert opinions that
25 Mr. Bryce Montgomery gave before the Division and before

1 the Board during the tank seam permit application.
2 They're the same opinions based on essentially the same
3 facts, and to the extent, to that extent the Board and
4 the Division have already ruled against the water users
5 on all of those issues.

6 We do need to look at some of the specific
7 things that Mr. Nielsen testified to.

8 Mr. Nielsen testified that there was a
9 fractured zone stated in the U.S. Geologic Survey
10 reports. He did not offer any evidence, any hard
11 evidence as to what that fracture zone consisted of,
12 exactly where that fracture zone was located, how severe
13 that fracture zone is.

14 In the tank zone hearing, which I will call
15 that, that was the board hearing on the significant
16 permit application for mining the tank seam, the evidence
17 was produced that in fact Co-op Mine had already mined to
18 the northern end of its permit area within the Blind
19 Canyon seam, had developed that seam, had done its cross
20 cuts and its haulage ways and did not have to rely on
21 theories, did not have to rely on USGS reports as to what
22 the fractures and faults were in that area.

23 Based on their mining within the permit
24 area, they had already established as a fact based on
25 personal knowledge that the permit area is not heavily

1 fractured. In fact there are very few fractures in the
2 mine. In most of the areas the floor is stable, the roof
3 is stable. Very few if any fractures are encountered.

4 So it's fine to talk about theories about
5 how heavily the area is fractured. The fact is that it
6 is not. And that is a matter that is already in the
7 record. We should not have to go forward and reestablish
8 that fact in the record. That area is not fractured.

9 Mr. Nielsen testified that there is a single
10 aquifer, general regional aquifer underlying the whole
11 area. That is the same opinion that Mr. Bryce Montgomery
12 offered at the tank seam hearing. The evidence that
13 Mr. Nielsen relied on is the very same evidence that
14 Mr. Montgomery relied on before.

15 And again in the tank seam hearing the Co-op
16 Mine offered contrary evidence as to the area in
17 geology. That evidence is already in the record. That
18 evidence establishes that there is not one single
19 regional aquifer underlying the entire area within the
20 permit area.

21 At least there is a bottom aquifer from
22 which the springs emanate. Above that aquifer is a layer
23 of shale. Above that is another layer of sandstone which
24 contains a separate aquifer which is not saturated.
25 Above that layer of sandstone is an additional layer of

1 shale, and above that is another sandstone layer which
2 again contains a different aquifer which is not
3 saturated.

4 And the water encountered by Co-op Mine
5 during its mining operations is in that top aquifer, that
6 the top aquifer is separated from the lower aquifer which
7 feeds the springs by two layers of sandstone and two
8 layers of shale.

9 The evidence before the Board in the tank
10 seam hearing was also that the shale, those two layers of
11 shale, which are about 50 feet deep, are not fractured,
12 that the shale is plastic in character, which means that
13 under pressure it flows together. So even if fractures
14 exist, the subsequent pressure seals those fractures off
15 and makes the layers impervious.

16 The board had that information before in the
17 tank seam hearing. The board found as a fact that to be
18 the case. Again Mr. Nielsen has given contrary opinions,
19 but it's not based on any evidence that would justify the
20 Division overruling the Board on that particular
21 finding.

22 We are left with a conclusion that the
23 Division is bound by in this case that the aquifer that
24 the mine has encountered during mining operations is not
25 the same aquifer that is feeding the springs. That has

1 already been established. The water users have done
2 nothing to come forward and disprove that particular
3 finding of the Board. The mine should not have to go
4 forward and reprove that same point that they've already
5 proved once.

6 We have heard somewhat again about this
7 incident that occurred in late 1989, early 1990, where
8 there was an anomaly in the water flow, the water
9 quantity and the water quality out of Birch Spring.
10 Mr. Nielsen has given an opinion that that resulted from
11 discharge from one of the mine portals. He's also stated
12 that probably that water came from Trail Canyon.

13 Again that evidence is inconclusive. We
14 still don't know based on the evidence that has been
15 submitted what caused that anomaly, whether it was from
16 the old abandoned Trail Canyon Mine seams, in which case
17 it is totally irrelevant, or whether it came from the
18 current mining canyon operation. And again the only
19 thing we have at this point is assumptions, speculations
20 and opinions on that point.

21 But let's assume that the argument that the
22 water users are trying to make on that point is true, for
23 the sake of argument. If we assume that in November or
24 December of 1989 the Co-op Mine did discharge water out
25 of that portal, what is the consequence to the Division's

1 decision today whether or not to renew the permit?

2 That's the question.

3 Assuming what the water users claim to be
4 the case, that was not an event that was directly --
5 would have been directly resulting from the mining
6 activities, but it would have been a single decision by a
7 person or persons, identities unknown, to do something
8 that would constitute a violation of the permit. The
9 remedy would be to elicit a violation and deal with it
10 that way.

11 There's nothing justifying the particular
12 relief that the water users are seeking in this
13 objection. Even assuming that what they say to be true,
14 it just is not relevant to what is going on now.

15 Furthermore, that incident was before the
16 Division at the last time that the Division approved the
17 permit renewal. The Division was aware of the incident,
18 but as now we are still not clear on the cause. The
19 Division was also aware of that incident at the time of
20 the tank seam renewal. The Board was also aware of that
21 incident at the time of the tank seam renewal. Nothing
22 since then has come forward to justify changing either
23 the Division's or the Board's mind on that point.

24 Some of the things that the Board did find
25 in that tank seam hearing was that Co-op's evidence on

1 the specific geologic characteristics of the permit area
2 was more credible than the water user's testimony and
3 evidence on that point. The evidence is the same. It
4 has not been changed since that point.

5 The Board has already found that evidence to
6 be more credible, with that finding, that the same
7 evidence this time cannot be found to have met the water
8 users' burden of proof on that point.

9 The Board also found that tritium testing
10 showed the water in the mine predated the nuclear age
11 well water from Big Bear Spring, confirming the mine is
12 hydrologically isolated from Big Bear Spring. That is a
13 specific finding of fact that the Board made at the tank
14 seam hearing.

15 We have heard additional information
16 regarding the tritium dating during this proceeding. The
17 information is new only in that it comes from analyzing
18 new water sources. The results and the findings based on
19 that tritium information is not new. The basic tritium
20 contents discovered from analyzing these new water
21 samples is basically the same information that the
22 Division and the Board ruled on during the tank seam
23 hearing.

24 There is no evidence on tritium testing that
25 should persuade the Division to vary its decision from

1 the decision the Board has already made, that the tritium
2 testing in fact does establish that Big Bear Spring is in
3 fact hydrologically isolated. The Board also found that
4 chemical analysis showed that there were dissimilarities
5 between the mine water and Birch Spring water.

6 We have new chemical analyses. They are new
7 only in that the analyses are taken from new water
8 samples. The substantive information conveyed is not
9 new. The information regarding TDS in various elemental
10 concentrations in the water compared to the information
11 that was already before the Division and before the Board
12 are not substantively different. They're certainly not
13 different enough to justify varying from the finding that
14 the Board has already made, that the chemical analyses do
15 show dissimilarities between the mine water and the Birch
16 Spring water.

17 Now the Board did not find that element's
18 alone conclusive. But the Board did find that Blind
19 Canyon fault, which is 800 feet east of Birch Spring, is
20 a fault that does one of two things: Either it is
21 completely plugged, in which case it would block any
22 water from going westward and prevent the water from
23 going to Birch Spring, or that same fault is not plugged
24 and it's open, in which case the water would be channeled
25 out the fault, and it would emanate at the place where

1 the fault contacts the surface.

2 And there is no spring at that place. The
3 conclusion that the Board made from that is that the
4 existence of that fault, the conditions that we observed
5 from looking at that fault, establish that the fault
6 hydrologically isolates Birch Spring from Blind Canyon.

7 We've heard absolutely nothing today that
8 would rebut that finding that the Board has already
9 made. Nothing that the water users have done has met
10 their burden of proof to counter the finding that the
11 board has already made on that point.

12 The Board specifically found that any
13 decline in water flow at this spring was from decreased
14 precipitation, not from Co-op's mining activities, and
15 the Board at the time had before it all of the spring
16 flow information, all of the water discharge information
17 and all of the precipitation information up to that
18 date.

19 It was mid-1984 anyway, and so all of the
20 information up to that time was already before the
21 Division, already before the Board. The only new
22 information we have is information dealing with spring
23 flows and so on since that time. As I already mentioned,
24 Mr. Leamaster established that since that time the water
25 coming out of Big Bear Spring has gone up, not down, even

1 though we are continuing to discharge water from the
2 mine.

3 I would point you to Exhibit 4, Plate 1,
4 which is Birch Spring flow. Now Mr. Nielsen stated his
5 opinion as to what he saw going on here, and one of the
6 things that Mr. Nielsen testified to is fairly
7 illuminating. He tried to explain the first peak we see
8 in the water flow out of Birch Spring which shows up in
9 this -- in this plate somewhere between March and August
10 of 1988. He stated that there was earthquake activity in
11 the area at that time, and that the peak and subsequent
12 drop in the water at that time was a result of that
13 earthquake activity.

14 If you will look at the plate right at the
15 beginning of that activity, and draw a line showing the
16 base flow of the water coming out of Birch Spring from
17 mid 1988, you'll notice that that event is the event that
18 caused a sharp, immediate precipitous and permanent
19 decrease in spring flow.

20 This is the evidence that the water users
21 have submitted in this hearing that established that the
22 decline in spring flow from Birch Spring was immediate,
23 precipitous and permanent, and it dated not from the date
24 of this '89, '90 incident. It dated not from the
25 inception of mining activity or some period. It was a

1 direct result of an earthquake incident that the water
2 users say occurred at that time.

3 Something happened underground as a result
4 of the earthquake to cut off this flow to this spring or
5 reduce it. And that I would submit is the water user's
6 own evidence as to the cause of the decline in the flow
7 at Birch Spring.

8 Mr. Nielsen admitted that it's possible that
9 the water we are hitting in the mining activity is a
10 perched aquifer. He doesn't deny that. He admitted that
11 as possible. That's not his opinion, but he does not
12 deny that could be the case.

13 I would point out that testimony was given
14 concerning the formation of certain icicles on the cliff
15 walls, certain water seeping from the cliff wall areas in
16 the mining area. That information was also before the
17 Division and before the Board during the tank seam
18 hearing.

19 It established that that water does flow out
20 and in fact it supports Co-op's theory of the case that
21 the Board relied on that information in part when it made
22 its decision. It's consistent with the water, the
23 hydrological conductivity that Mr. Nielsen testified to
24 as to the rate of water through those shale, through the
25 sandstone croppings, that the water seeps out at a

1 certain rate on the order of 10 to minus 2 to 10 to minus
2 3 per day.

3 That's consistent with the showing that
4 water seeps out gradually and it evaporates when it hits
5 the air, which has already been placed in the record as
6 to what actually occurs.

7 I would remind you of the site visit we had
8 last time where water was actually pointed out to you in
9 the mine area where that is in fact still occurring.
10 That's what happens to the water that is encountered. If
11 it goes anywhere, it eventually reaches the surface and
12 evaporates long before it reaches the springs.

13 Mr. Nielsen testified that you do from time
14 to time encounter perched aquifers in the general area;
15 that when those perched aquifers are encountered, that
16 they are above the regional aquifers. For a perched
17 aquifer to exist it requires areas of nonsaturated
18 sandstone in between. That was his testimony.

19 That's what we actually encountered. It's
20 been established that we have two sandstone layers
21 between the aquifer that we are encountering in the mine,
22 mine seam and the aquifer that's feeding the spring. All
23 three of those aquifers are in nonsaturated areas.

24 Mr. Nielsen testified his opinion was the
25 entire formation is saturated above this potentiometric

1 surface he referred to exists. That was his opinion. It
2 does not comport with the facts that are already before
3 the Division and the Board.

4 That opinion is contrary to the actual
5 facts, and the fact that he has an opinion that
6 contradicts the facts states more to his qualification to
7 testify as an expert rather than the truthfulness and the
8 reliability of his opinion.

9 Mr. Nielsen testified that in his opinion
10 the monitoring wells that Co-op Mine has in place are
11 inadequate. He didn't really go into very much detail
12 why he thought they were inadequate. That is not a
13 matter for an expert opinion to make an opinion on. It
14 doesn't matter what he thinks; that the Division has
15 already found those monitoring wells are adequate. The
16 Board has already found during the tank seam hearing that
17 those monitoring wells are adequate. We've heard nothing
18 to this date to justify varying from that finding of
19 fact.

20 Mr. Nielsen has also testified quite a bit
21 about other springs being used as a control to compare
22 what's going on in there to what's going on in their
23 springs. I would point out that the Board specifically
24 found during the tank seam hearing that the Little Bear
25 Spring in particular is not useful as a control.

1 I would submit that based on that decision
2 that the Division should go along with what the Board has
3 already ruled, that the Little Bear Spring is not useful
4 as a control, and based on that same ruling find that
5 even more remote springs are even less useful as
6 controls.

7 Mr. Nielsen testified that the chemical
8 analysis that he's seen indicate that the water in the
9 area generally emanates from the -- comes from the same
10 recharge area. We've never disputed that fact. The
11 question is what happens to the water after it reaches
12 that discharge area.

13 The evidence is unrebutted that it goes
14 downgradient, part of it goes clear to the bottom aquifer
15 where it goes to the springs. Another part reaches one
16 of the shale layers that exist in the area and goes into
17 that aquifer. Another portion goes into the upper
18 aquifer.

19 And once the water reaches all of those
20 individual aquifers, that's where it stays. It doesn't
21 go to the next aquifer. The actual factual evidence on
22 that point is unrebutted.

23 Again I think that was partly also from the
24 deuterium oxygen comparison that was made. The testimony
25 was that those analyses show that the recharge came at

1 similar temperatures, similar locations. Again we
2 haven't disputed that fact. The question is what happens
3 to the water after it gets into the ground. And we've
4 already established what happens, and the water users
5 have not met their burden of proof that it is anything
6 other than what has already been established.

7 Mr. Nielsen testified that generally,
8 although he didn't have any site specific data, that the
9 Menko shale permeability generally tests on the order of
10 10 to the minus 7 to 10 to the minus 8 feet. I did a
11 fairly quick calculation based on Mr. Nielsen's testimony
12 on that point.

13 As I said we have two Menko shale tongues
14 between the water that the mine encounters during mining
15 activities and the aquifer feeding the springs. Each of
16 those shale layers is 50 feet or more in thickness.
17 Using that permeability rate, it would take between one
18 and 10 million years for water to go through each of
19 those shale layers.

20 So we are looking at a minimum of two
21 million years for water to percolate down from the water
22 that is encountered in the mine to the aquifer that is
23 feeding the springs, making it difficult to think that
24 the water is going to make it from the mine level to the
25 spring level in our lifetimes. And again this is based

1 on Mr. Nielsen's own testimony.

2 The flow diagrams in Exhibit 4, I think
3 particularly Plate 7, again I would submit Mr. Nielsen
4 argued, makes some arguments about what he thought that
5 those lines indicated.

6 I would submit that an examination of those
7 lines, particularly tracing the baseline data, shows that
8 even Little Bear Spring, which is not useful as a
9 control, as well as Big Bear and Birch, began having a
10 slow but steady decline, and a similar decline back in
11 1986 at least, and possibly before that, possibly even
12 before mining activity began in the area; that those
13 lines do track the decrease in precipitation flow; that
14 they establish that the reduction in the water results
15 from the reduction in precipitation in the area, not from
16 mining activity.

17 And I would ask that the Division try to do
18 some smoothing on those lines to establish that in fact
19 the lines even in Little Bear establishes a slow but
20 steady decline in the area resulting from decreased
21 precipitation, and certainly in Little Bear not from mine
22 activity. And by the same argument, not from mining
23 activity in the other two springs too.

24 Mr. Nielsen stated his opinion that the
25 mine's PHC has no baseline monitoring program. That was

1 an issue that was already raised by the Board during the
2 tank seam hearing. It was already argued before the tank
3 seam -- in the tank seam hearing. The evidence was put
4 on in that hearing.

5 Co-op Mine put on counter evidence to
6 explain exactly where that baseline monitoring
7 information was. The Board found that the baseline
8 monitoring requirement was satisfied. There's been no
9 evidence presented to the Division to this date to
10 justify going against the Board's decision on that point.

11 Is there anything else?

12 MR. MAYO: I think you covered it.

13 MR. M. HANSEN: In summary, it has been the
14 water user's burden of proof to come forward with some
15 evidence to persuade the Division that it should change
16 its mind. None of the evidence that has been presented
17 by the water users throughout this entire proceeding is
18 sufficient to overcome the information and evidence that
19 was already before the Division when it made its decision
20 that the water users have not met its burden of proof.

21 Mine should not have to meet, to come forth
22 and establish new evidence, to reestablish the points
23 that have already been made. We should have a ruling in
24 effect now.

25 I would ask the Division to make some

1 specific findings and conclusions in its ruling. First,
2 that the water users have not met their burden of proof
3 in this case, in their prima facia case.

4 Second, based on the record, based on the
5 evidence that has been produced already to date in this
6 informal conference, based on the information that is
7 already in the record in the permit application itself
8 and the evidence submitted to the Board during the tank
9 seam hearing, and elsewhere in the record, that as a
10 matter of fact the Big Bear Spring is hydrologically
11 isolated from Co-op Mine's permit area.

12 We would ask for a specific finding that
13 Birch Spring is hydrologically isolated from the permit
14 area, and from those two findings I would ask for a
15 specific ruling that the mining activity does not
16 adversely affect the springs and that the permit has in
17 fact been designed to prevent material damage to the
18 hydrological balance outside the permit area, and finally
19 for a decision to uphold the Division's decision to date
20 to approve the renewal of Co-op Mine's permit. Thank
21 you.

22 MR. CARTER: Thank you. Let me make a
23 couple of observations that may guide. You'll have an
24 opportunity to respond here obviously. First, and this
25 is something that I had been thinking about a little bit

1 over the last two days, interestingly enough, and that is
2 what effect, if any, do boards, the Board's factual
3 findings in a case which is not this case but in a mine
4 which is this mine, and it's the same springs and the
5 same basic issues, to what extent is the Division
6 controlled by those findings of fact?

7 And without disrespect to the Board and
8 without precipitating further argument about the law of
9 the case, the facts and so forth, I think that I have
10 been operating under the assumption that the Division is
11 free to examine certainly new facts or new factual
12 information that it did not have available to it at the
13 time it made certain factual findings to support a
14 decision one way or the other.

15 But I think the Division is also free to
16 look at the same facts and apply new analysis, that is if
17 the Division looks at the facts and says, well, that's an
18 argument we didn't think of, or that's an interpretation
19 we didn't think of, we're going to roll that into our
20 thinking, and that may change a legal finding that we
21 come to based upon facts that we've already concluded.

22 I think the Division is also free to do
23 that. But as I said, in order to avoid precipitating an
24 argument about that, I would also point out that whatever
25 the Division does is really not prejudicial, because the

1 Board is free to substitute its judgment completely; that
2 is, the Board reviews these things de novo. And that is
3 reviews the Division's decision de novo.

4 So if the Division acts without sufficient
5 information, or if the Division makes a decision and the
6 Board said no, we already decided that, we're trying to
7 undo our decision, the Board's free to do that. There's
8 no prejudicial effect.

9 I'm not trying to precipitate an argument
10 about what the law of the case or the facts of the case
11 are based on what the Board's done in the past, but just
12 to telegraph to you that I agree that what the Division's
13 job here is to look at all of the facts that we have in
14 front of us, all the determinations we've made in the
15 past, all the interpretations we've applied to those,
16 together with all the information that's been submitted
17 and the new argument that that's been submitted about,
18 what that new argument meant and what conclusions we
19 should draw from to possibly draw a new set of
20 conclusions.

21 But I think that there is a burden on the
22 part of the objectors. There is a presumption that the
23 Division has acted correctly to date. So it's a de novo
24 Division for the Division. The Division is going to take
25 its analysis and decisions in the past and reexamine

1 those in light of the new argument.

2 So I'm trying to portray for you I think
3 where we're headed, what I think the Division's job is,
4 and it may answer the question about whether or not a
5 case needs to be put on by Co-op. It may be, and I'm
6 inclined to close the hearing at this point until people
7 have an opportunity to think this through, but it may be
8 that when the water users are finished, that unless Co-op
9 feels that it needs to specifically rebut something in
10 some manner other than what you've just done, you're not
11 required to do that.

12 That you may if you wish, but you don't need
13 to; that the Division will just act on whatever
14 information it has available to it and it will make a
15 determination. And then if the Board, if the Board
16 reviews this determination and has more new information
17 or simply disagrees with the conclusions of the Division,
18 the Board would do whatever it's going to do.

19 I don't know if this is clarifying, but I
20 think at least in my own mind we may have most of what we
21 need to have, what I need to have in order to make a
22 determination about whether or not the burden has been
23 met, whether or not the Division should change its mine
24 about some of the conclusions it's made to date. So
25 having said that, I don't know if that's helpful or not.

1 MR. M. HANSEN: May I respond briefly? It
2 won't be to argue or anything like that.

3 MR. CARTER: Sure.

4 MR. M. HANSEN: I believe you stated at the
5 beginning of this informal conference that you weren't
6 going to get bogged down in legal issues, like collateral
7 and estoppel and so on. I'm not making that argument and
8 I'm not making it in this case. And I don't believe that
9 I argued that you should consider yourself strictly bound
10 by the decisions that the Board has made.

11 But it is my argument that if the Board has
12 made a decision based on a certain set of facts, that
13 unless the water users come forward with some specific
14 new information to counteract those facts that have
15 already been made based on the information that's already
16 in the record, then there should be no reason to vary
17 from the decision that's already been made.

18 MR. CARTER: I understand. To stand by
19 logic rather than by laws is what you're saying. I
20 didn't mean to suggest that. Mr. Smith?

21 MR. SMITH: Well, let me just go ahead. I
22 think you have clarified things. First, as I was
23 listening to Co-op's argument, I was thinking about the
24 old adage that generals always want to refight the last
25 war because that's what they know and that's what they

1 trained at West Point; so, you know, they start trying to
2 fight because they want to do that.

3 And I think that's largely what Co-op's
4 trying to do here. And that's certainly not what we're
5 interested in doing, and I don't think that's what we've
6 presented in our case thus far. We presented a lot of
7 new information, new evaluation, and we are not trying to
8 refight the last war.

9 I think what's -- and I'll let Mr. Appel
10 talk I think more on specifics, but I wanted to try to
11 maybe focus on there's one key issue that Co-op has to
12 maintain to keep this permit renewal, and that is that
13 these mines, this mine is somehow hydrologically isolated
14 from these springs, and that the diversion of water
15 that's occurring in these mines has nothing, you know,
16 has no impact on these springs. Because if they do have
17 an initial impact on the springs, we're in a whole
18 different situation here.

19 And I think we've shown the information that
20 they have not met -- their PHC that they provided does
21 not meet their initial burden to do that and that the
22 Division has made a mistake in accepting that. In fact
23 the Division is being inconsistent with itself.

24 And let's go back to some testimony that
25 Mr. Leamaster provided us; some interesting new

1 information that we didn't have until after the last
2 thing with the Board. And that's that letter as you'll
3 recall, Mr. Carter, from, a letter from the Division that
4 Mr. Leamaster read into the evidence as part of his
5 testimony. And it says -- I'll quote Mr. Leamaster.

6 This was a letter from the Division and what
7 I'm saying is the Division is being inconsistent with
8 itself, and I think that's got to be dealt with I think
9 at the Division level, and that's why we're here. It
10 says:

11 "Based on facts that the Division
12 has received from Co-op on its November
13 27th, 1997 division order and the
14 verification of the pumping system and
15 setup conducted on May 16th, 1991 by Jesse
16 Kelly, the Division has made the following
17 observations: Pumping water into the old
18 workings via the old pumping and piping
19 system most probably had an effect on the
20 balance of the old workings causing a
21 discharge to occur at the outcrop
22 potentially affecting Big Bear Spring."

23 That was information we didn't have. We
24 didn't have that memo. It was an internal memo from the
25 Division.

1 Why that's important is because if you're
2 putting water into the mine and it's coming out at the
3 springs, taking water out of the mine can affect the
4 springs. And that's a very important conclusion, in
5 fact, and it was confirmed by Mr. Reynolds here at this
6 hearing.

7 You asked the question about that. You
8 said, "Let me ask Charles. This is kind of a mixed
9 thing, but generally the informals I get to ask questions
10 whenever something pops up."

11 You asked him about this situation, and he
12 said that water at the time was discharged in the old
13 workings. Now this was exactly the time that we had the
14 big flow out of Birch Spring. After looking at it and
15 evaluating it as a result of comments and discussion,
16 that was discontinued back at that time.

17 That is where the water was being discharged
18 in '91. So they were moving, putting water in their old
19 workings. This was '89. This was the spike in Birch
20 Springs. This is the interconnection.

21 And I would submit to maintain their permit,
22 their renewal, they've got -- they've got to show that
23 these are isolated. Well, they're not isolated. These
24 are not hydrologically isolated mine. So in fact this
25 is -- so this is information that's come to light in

1 this hearing that was not even considered by Earth Facts
2 when they prepared their 1993, April 26 revised
3 hydrologic evaluation.

4 And on page 2-38, I'm not going to read this
5 all, but it -- I'll just direct your attention to that.
6 They talk about the increased flow in Birch Spring and
7 they say that's the same time water was encountered in
8 the mine. They don't account for the fact it was moved
9 to another part of the mine and then it impacted on Birch
10 Spring. They didn't know that. Either they didn't know
11 it or they didn't report it. It's not here.

12 No one's talked about the pumping of old
13 work in the workings in this report. What they say is
14 they try to close it off and say, well, this should be a
15 repercussion in flow of the springs because we were
16 encountering water. They were assuming it was being
17 moved out of the mine into the surface. Well, it
18 wasn't. It was being moved into the old workings.

19 So again these are the documents. This is
20 what Co-op has to live by. This is what's got to be
21 sufficient legally for this permit to be renewed.

22 And these do not address this extremely
23 important event that occurred in 1989 where waters were
24 pumped into the old workings at the exact same time that
25 water with quality problems started coming out in Birch

1 Spring, the big spike. And when they stopped doing,
2 putting the water into the old workings, the flows
3 decreased in Birch Springs.

4 And so I think the Division's got to take a
5 hard look at this situation. This is just one instance.
6 And I'll let Mr. Appel talk about all the other new
7 information. We brought the new analysis we brought, the
8 new testing we've done. A lot of that was misquoted by
9 Co-op, and I'll let him correct that.

10 And I guess I'd just like to close that if
11 Co-op really believes, and I think you pointed this out
12 as well, if they really believe they have a sufficient
13 hydrologic evaluation here, they should just fold up
14 their books and we should close this hearing right now
15 and go home. Because if they think that it's sufficient,
16 they don't need to put on a case.

17 And if it is, it is. And if it isn't, it
18 isn't. I don't think they're going to do that. But
19 that's what I would suggest. If they really believe we
20 haven't met our burden, they ought to save themselves the
21 time and the money and they can send their experts home
22 and we can all go home and let you look at what we have
23 here and ponder that.

24 That's not what's happened. This mine is
25 not hydrologically isolated from these springs. This

1 mine is interconnected with these springs. Water is
2 being moved out of the mine. It's the same water that
3 was at one time providing additional water to the aquifer
4 that feeds these springs.

5 And that's basically -- that's where
6 their -- that's the fatal flaw in their hydrologic
7 evaluation. And that's the thing that I think your folks
8 at the Division need to go back and take a hard look at
9 because you're being inconsistent. At one point your
10 people are finding, hey, there's a connection here and
11 now they're reading to buy into this hydrologic
12 isolation.

13 It's just not the case, and there's a
14 hydrologic interconnection, and that's got to be dealt
15 with. And it's got to be dealt with because then they
16 have to deal with -- if we have a spring, I'm talking
17 about Birch Spring, that can be contaminated by the
18 workings of Co-op Mine, that spring is at risk every
19 single day. We're at risk right now that that water and
20 people who depend on that water could have, could be
21 poisoned.

22 The facts are the facts. If something got
23 out into that mine, gets into this spring, there's no
24 safety valve. It goes right into the system, and people
25 are drinking from this. So we're at risk right now from

1 this and they've got to under federal and state law
2 replace that water.

3 And I'll close at that and let Mr. Appel
4 close some of the specific points I know he wants to
5 cover.

6 MR. APPEL: Okay. First of all, I tend to
7 agree, I do agree with Mr. Smith concerning how much
8 evidence we have and that Co-op's case has to be what's
9 in the PHC. It doesn't necessarily include what the
10 Board found because much information was presented to the
11 Board that's inconsistent with what's in the PHC and
12 different and supports it differently. It's a different
13 spin on new information, and frankly it's just
14 different. So they're bound by the PHC.

15 And the issue before you is whether this PHC
16 is adequate and whether this particular mining exercise
17 can impact these springs. That is not what was before
18 the Board. I don't care how many times Mr. Hansen wants
19 to argue it. I think it's improper to argue it now since
20 it's pending before the Supreme Court, and we simply have
21 to go forward and cast basically a blind eye to that I
22 think and develop the information.

23 But it's pretty clear that the presentation
24 before the Board didn't occur before the Division, and
25 the PHC doesn't say all those sorts of things. I'm happy

1 that you clarified it at the end because it saves me from
2 reading what you said in the beginning. Suffice it to
3 say they're consistent and I believe that you're looking
4 at this correctly and you've raised some of the important
5 issues in that regard. I'll get to those in a minute,
6 though.

7 I guess the summation of Mr. Hansen's
8 statements are that there's nothing new, the old
9 information is sufficient. With respect to that he went
10 through each of the witnesses, so I'll do the same.

11 Mr. Leamaster testified to a rather
12 important point that Mr. Hansen has conveniently or
13 otherwise admitted, where is the replacement water? 15
14 shares in Huntington Cleveland Irrigation Company is
15 going to take care of a day of lost demand. And that's
16 one of the things that Mr. Leamaster did a very nice job
17 on. It is not there.

18 This permit shouldn't -- shouldn't be --
19 I'm sorry, shouldn't be renewed based on that alone.
20 They can't do it. It's an impossibility. You can't take
21 water from the same sources that you're going to
22 interfere with and say it's replacement water. It can't
23 be done.

24 MR. CARTER: Let me just ask a clarifying
25 question. Your argument would then be that a

1 prerequisite to issuing a permit would be to identify
2 replacement water.

3 MR. APPEL: Yes.

4 MR. CARTER: I just want to make sure I
5 understood that. We've never done that in the past.

6 MR. APPEL: That's the way we read it.

7 MR. CARTER: All right.

8 MR. APPEL: He also said that there's more
9 water in the mine. Well, Mr. Leamaster said that there's
10 evidence that there's more water in the spring. I'm
11 sorry, in the spring. Compared to what? That's part of
12 the equation. What Plate 7 shows is that yes, Big Bear
13 is coming back, but far more slowly than the legitimate
14 control, which is Little Bear that we see, and it's not
15 coming back to anywhere near the historic levels that it
16 would have.

17 So it may be coming back, but compared to
18 what? Certainly not compared to premining because what
19 our expert has testified to is there's a 47 percent
20 decrease from premining and postmining.

21 And Plate 7 says it all, for all of the
22 springs compared to the precipitation. The response of
23 that system, that hydrologic system, is noticeably
24 different. It's not shaving fine on anything. It's
25 noticeably different since mining began. We think we've

1 eliminated all the other causes to that.

2 I've mentioned that the tank seam
3 controversy just -- it cannot bind us here. This permit
4 wasn't before the Board. It just cannot work that
5 particular way.

6 As far as new information from Peter
7 Nielsen, you can't have missed the fact that there are
8 five different approaches that were undertaken which are
9 not undertaken by the objectors before the Board.
10 There's a very good reason for that. We didn't believe
11 the Blind Canyon seam was an issue. Suddenly we found
12 out it's at issue.

13 We think it's basically a violation of due
14 process. We've gone through all that before and it's on
15 appeal to the Supreme Court. So we have put on our own
16 testimony.

17 The case you've seen today is the case the
18 Board would have seen if they had not told us we were
19 limited, which is part of the frustration we've had in
20 trying to present our case in the past and dealing with
21 those particular objections from Co-op.

22 We have taken samples from the mine with the
23 assistance of the Division. We've provided new
24 information and new studies, chemical studies. I think a
25 better tritium analysis shows something completely

1 different, but it's based on cognizable samples and
2 additional new information.

3 One conclusion that still amazes me to hear
4 from the Co-op is that the only area in this whole region
5 it appears that's not heavily fractured just happens to
6 be right above, right through the permit area. I don't
7 know how that can be. I think it's as easy as taking
8 your 10-year-old up and asking him if the crack stops at
9 the permit area on the cliff face in that canyon or not.
10 You can see them. You know they're there. The best
11 geologists that have looked at this situation know
12 they're there. They would have you believe that they're
13 not.

14 Which leads us to the event, as we call it.
15 Finally, we have the Co-op admitting that yes, indeed,
16 they did dump water down the old workings.

17 MR. M. HANSEN: Okay. I mean you don't
18 normally object during argument --

19 MR. APPEL: Then don't.

20 MR. M. HANSEN: I didn't say that I did. I
21 said let's assume that to be the case for the sake of
22 argument.

23 MR. APPEL: You may not have said. Well,
24 Mr. Reynolds' admitted that, yes, we did put water into
25 those old workings. They have resisted that conclusion

1 basically until this particular hearing. We're glad to
2 hear it because when the water went down there, it
3 demonstrated the interconnection between those mine
4 workings and our springs. That's why the flows went up;
5 that's why the different components showed up. It
6 shows. It demonstrates the inner workings. These are
7 not hydrologically isolated. You just can't believe it.

8 The tritium results are very different.
9 They have said that Big Bear Spring is new water and
10 Birch is old. They're half right. Big Bear Spring it
11 turns out because of the values we've found is a mixture.
12 And then you look at Plate 7, and you can see why it is
13 affected by precipitation and it's affected by the
14 regional aquifer.

15 We think they're intercepting the perched
16 water, the regional aquifer, and the natural recharge
17 from up above. They're intercepting all three. That's
18 certainly new information. They've again said that the
19 only water they're intercepting is the perched water.
20 I'm looking forward to hearing from some of their experts
21 because based upon their questions, I'm pretty sure they
22 don't believe that's the case. This is their new
23 experts.

24 Perched water is just part of the equation.
25 These structures, stratigraphy that we see over there

1 operates as a unit, and the perched water is certainly
2 part of it. But I think the evidence clearly shows that
3 they're into the potentiometric surface of the regional
4 aquifer. Yes, they're intercepting perched water. Yes,
5 that is tributary to our springs and they're diverting
6 that away from them too. So they're diverting several
7 sources of water away from the springs. And it comes out
8 the portal.

9 Now, I've mentioned the problems with the
10 replacement source and the lack thereof. I think that's
11 very important, and we believe they have to identify it
12 prior to renewal. And it has to be a viable one, one
13 that's going to work, one that's going to be
14 replacement.

15 The testimony you'll hear a little bit later
16 will be that Co-op has moved water around quite a bit
17 just to get rid of it. It has an open meter and it has
18 an anionic discharge. I'll leave you to consider that
19 particular testimony.

20 We think they've impacted the flow of the
21 springs in the past and are continuing to do so. And
22 it's not just that they affected it in 1989 and 1990 and
23 1991. And we can get over that because they're going to
24 be more careful. Testimony is it hasn't recovered and
25 that the historic recharge patterns have been

1 irretrievably altered.

2 We're going to have to do something about
3 this. It's not -- this isn't just the next 15, 20 years
4 of mining. We have to deal with the future people here
5 long after the Co-op has packed up and gone, has taken
6 their profits with them.

7 The baseline monitoring is basically
8 nonexistent. To suggest that the Board found the
9 baseline monitoring was sufficient, I'm not certain where
10 you would find that in that decision. If it's there we
11 didn't really present much evidence on that again because
12 we were there for an entirely different purpose.

13 But I think the testimony's pretty clear
14 that there aren't enough wells to monitor and determine
15 the impacts. They need to do some more wells for the
16 exact reason Dr. Mayo was asking the questions that he
17 did: Those potentially have to fall or they don't have a
18 control on the outside.

19 That says to me we better answer that
20 particular question because they're on coterminous with
21 the extent of the mining. We need to understand that.
22 Even though the information that they have produced leads
23 to the conclusion that the potentiometric surface has
24 been intercepted and is falling off, and that's Exhibit
25 5, I believe. These wells have not been adequately

1 maintained and they're not in operation. That's new
2 information too.

3 For them to suggest that just because the
4 Board found in the past, if this is the case, that
5 baseline monitoring was accurate, does that alleviate
6 them or make it so that they don't have to maintain them?
7 I think the answer has to be no.

8 We started out by asking for conditions to
9 the permit or that the permit be revisited and the PHC
10 redrafted. We're sticking with all of those. And it may
11 be that mining can't go forward until that is done.

12 But at a minimum we have gone back, and what
13 we're asking the Division to do is see if they've done
14 what's required by law. Again we're going back to a
15 document that's been in existence for a while.

16 I guess that's really all I have at this
17 point.

18 MR. CARTER: Let me ask a question about the
19 old workings issue because that puts a slightly different
20 spin on it than at least I had. Maybe everyone else saw
21 this. What Craig was talking about was the argument that
22 it was not so much discharging the water onto the surface
23 as it was pumping water into previously dry old workings
24 in the mine that produced this spike in flow. My
25 question would be --

1 MR. NIELSEN: No, that's not right.

2 MR. CARTER: Oh, I misunderstood.

3 MR. APPEL: If you guys understand it,
4 speak. We're still --

5 MR. CARTER: Yeah.

6 THE WITNESS: What he's saying is discharge
7 the Dry Canyon from the ventilation portals of the Dry
8 Canyon seam probably flooded the Trail Canyon area where
9 it subsided, which then saturated the fault zone after a
10 certain amount of water built up in the Trail Canyon.

11 MR. CARTER: Okay.

12 THE WITNESS: That's where that large volume
13 of water 63 acre feet built up, saturated and discharged.

14 MR. LEAMASTER: And then they moved the
15 water into the old workings which impacted Big Bear, the
16 Big Bear Spring.

17 MR. CARTER: Okay. Now I am confused. So
18 the assertion would be that moving water into the old
19 workings had an impact on Big Bear Spring. In looking at
20 the graph, I don't see a spike in the flow of Big Bear
21 Spring that would suggest there was water getting in
22 there that shouldn't have been, or a change in quality.

23 MR. APPEL: Didn't we have a change in
24 chemistry?

25 THE WITNESS: Well, right here in Plate 7

1 for Big Bear Spring.

2 MR. CARTER: Got it.

3 THE WITNESS: You'll notice that in -- well,
4 it's about January or February of 1990, you see a spike
5 kind of offset from the spike from Birch.

6 MR. CARTER: Got it.

7 THE WITNESS: That's occurring at a time
8 that you would normally not have that occurrence from
9 material that's recharging. It declines, and then you
10 see a gradual increase in flows until you reach a peak
11 about April of 1992, and then it declines again. That's
12 that period we've demonstrated -- well, that we've
13 received by testimony, and we've heard previously that
14 they were discharging into the old abandoned section of
15 the Bear Canyon Mine directly above Big Bear Spring.

16 So what you have is you've got water being
17 pumped into these old abandoned workings. It's flooding
18 it. It's building up a hydrologic head that begins to
19 discharge. The head bulges sufficient to build the
20 fractures and increase the different charge of Big Bear
21 Springs.

22 MR. M. HANSEN: Excuse me. Is this argument
23 or evidence? Because if it's evidence I'm going to
24 object because --

25 MR. APPEL: It's a response to a question.

1 MR. M. HANSEN: Because the water users have
2 closed their presentation of the evidence. If they are
3 making an argument, that's fine. If they are trying to
4 present new evidence at this point, I object to it.

5 MR. CARTER: I remember this discussion
6 about the spike occurring at an unusual time of the
7 year. And I didn't make the connection that that was
8 related to the same time that the water was being put
9 into the old workings, so --

10 THE WITNESS: If you look at Plate 2, which
11 is a flow curve of this, you also notice that you also
12 have the increases in sulfates and TDS, and we also had
13 the oil and grease show up in the oil in the spring.

14 MR. CARTER: So the argument that flows out
15 from that is that demonstrates there's a hydrologic --

16 THE WITNESS: There's a hydrologic question.

17 MR. CARTER: The question I would like to
18 ask, you don't have to answer this, but for the quality,
19 more quantity's not a problem. I mean getting more water
20 out of the spring would be a good thing. But the problem
21 was --

22 THE WITNESS: What this shows is that the
23 TDS increased, sulfates increased above drinking water
24 standards and oil and grease were identified in the
25 spring.

1 MR. CARTER: But that has since gone away
2 since water is no longer being pumped into those old
3 workings.

4 MR. SMITH: You're exactly right.

5 MR. CARTER: I just wanted to make sure I
6 understand.

7 MR. APPEL: This demonstrates the
8 interconnection. That's really why it's submitted. It's
9 an old event. We hope it never happens again. Don't
10 know that it will.

11 MR. CARTER: I just want to clarify. I
12 think that was all in, but I don't think I put it
13 together that way. Thank you. Anything further,
14 Mr. Appel?

15 MR. APPEL: No.

16 MR. CARTER: Your witness is here.

17 MR. SMITH: Yeah. Mr. Atwood is here, and
18 we'd like to -- he has -- unless there's something
19 else, we'd like to call him and get his testimony on.

20 MR. CARTER: Shall we?

21 MR. M. HANSEN: We may as well go forward
22 before I have my final reply, if I'm entitled to it.

23 MR. CARTER: You are indeed. Let's do that
24 again. Are we needing a break?

25 (Recess taken.)

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GALEN G. ATWOOD,

called as a witness, for and on behalf of the
Plaintiffs, being duly sworn, was examined and
testified as follows:

EXAMINATION

BY MR. SMITH:

Q Mr. Atwood, could you state your name and
address for the record.

A Galen Garth Atwood. I live at 15 South
Center Street in Elmo.

Q And I understand at one time you worked at
the Co-op Mine, the mines that are at issue here today?

A Yes.

Q Can you tell us what years you worked there?

A I started at the Co-op Mine in spring, I
think it was in May of 1988, and worked until August of
1992. I was hired as a section foreman.

Q Okay. Can you just go through the jobs you
had? I take it you worked underground in the mine?

A Right.

Q Can you just take a minute and go through
the jobs that you held while you were at the Co-op Mine,
kind of what period of time the job was and what the

1 responsibilities of that job was?

2 A I can't remember the exact dates. I started
3 out as a production foreman, and I done this for about a
4 year and a half, almost two years. And then I was -- I
5 started a safety department, and I was also called the
6 compliance officer, which the job was to take care of the
7 dealings with the State and Federal mine inspectors and
8 with the Department of Oil, Gas and Mining inspectors for
9 compliance with the permit.

10 Q And so you were responsible for interfacing
11 with the DOGM personnel?

12 A Right. And this was at the time, I was also
13 over the what we call exploration, which was the core
14 drilling, the sampling in the mine for the lower seam and
15 the upper seam at the time we were proposing to mine into
16 there.

17 Q Okay. And I take it you no longer work in
18 the Co-op Mine?

19 A No. I had a back injury in '92 and did not
20 return to work for them.

21 Q Okay. Now at one time you were also on the
22 Board of Huntington Cleveland Irrigation Company, but I
23 understand you're no longer a Board member?

24 A I resigned about three months ago.

25 Q And do you have any stock in Huntington

1 Cleveland Irrigation Company?

2 A No, none.

3 Q Do you have any position with the North
4 Emery Water Users Association?

5 A No, I don't.

6 Q Do you get your water from them?

7 A No, mine comes from Castle Valley, Elmo,
8 Castle Valley.

9 Q And you have no position I take it with
10 Castle Valley?

11 A No.

12 Q And you have no position I take it any
13 longer with Co-op or the company that runs the Co-op
14 Mine?

15 A None.

16 Q Okay. I understand that you're familiar
17 with how water was handled, water that was encountered in
18 the mine was handled.

19 A In all coal mining you always have some type
20 of water in the face area according to the dip of which
21 way your seam dips. If it's going to where you're mining
22 downhill, the water accumulates in the face all the
23 time.

24 You use water for dust suppression, for roof
25 hold, plus what water comes out of the roof and out of

1 the ribs or the walls, and as the water accumulates in
2 the face, you have to get rid of it. You have to get it
3 out of your way so -- I can find mine. So you pump it to
4 an area to get it out of your way.

5 That's your main concern. After that time
6 there's so much water accumulates in a place then goes
7 someplace else, so you've got to pump it. So you move it
8 from one place to another place in the mine till you get
9 it outside. It's common. All mines do it. That's part
10 of mining. That's the way it's set up.

11 At Co-op we had a discharge permit that was
12 located down by the scale house. I can't remember the
13 amount of flow we were allowed to discharge. At certain
14 times when we were mining in certain areas of the mine,
15 we were making more water than we had permit to
16 discharge, and so we had to put the water someplace to
17 get rid of it so we could continue mining.

18 And so it was pumping from the north down
19 into the old works; one section to another, just
20 different areas in the mine, wherever we could get rid of
21 the water so we could continue mining is what we done.

22 Q So this is water that you encountered beyond
23 what you could use in the mine, I take it?

24 A Right.

25 Q And can you say approximately how much water

1 on a daily basis you were encountering beyond what the
2 inside uses in the mine were?

3 A Boy, it's hard to say. It depended on which
4 section you were in. All coal mines I worked in the
5 mine's 22 areas, and all coal mines as you're advancing
6 the faces and you're in a wet area, you make water as you
7 go along. As you move past that area, it dries up behind
8 you.

9 So you can go into an area of the mine now
10 that looks like it's been dry that maybe when we first
11 mined it it was really, really wet. And so it's really
12 hard to tell. The north sections of the mine, when we
13 got up into there, we had the coal seam split on it, and
14 it made a lot of water. It is in a dip area where it is
15 dipping down so the water accumulates into the face, and
16 when I left they was still using that for sump area and
17 was pumping water from there down into the old works in
18 '92.

19 Q Do you want to just -- we have put up -- I
20 believe this has been previously marked. Has it been as
21 an exhibit or not?

22 MR. CARTER: I don't think I've seen it.

23 MR. SMITH: Why don't we mark this as an
24 exhibit. What are we up to? 7?

25 MR. CARTER: 7.

1 As we were mining here, we pumped water.
2 This area right here was wet, and we pumped water out
3 here and down. Now you can see when we mined in these
4 little jogs, that's common in a coal mine. That is what
5 we call sumps. You just go down around a cross cut, take
6 the bottom coal, and it's on the low side of the entry so
7 the water will run in there, so you can get a pump in
8 there and get rid of it.

9 We pumped this water. When we were in here
10 we were pumping the water, pumping it out along the
11 beltway, went out along the fan, went out the hill and
12 was discharging down at the creek where our discharge
13 point is.

14 Then we come on over here and we mined on
15 out till we hit the other fault here. I don't know what
16 they call this one, but it's the one that goes on down
17 that canyon. We turned and we mined back this direction
18 and broke into here. Then we come back and we mined over
19 in this area.

20 When we come here we installed a water line
21 down this entry, and we were making more water up in here
22 than we had pipe and we had permit to discharge down
23 here. The pipeline was put in and we pumped out the west
24 portals for a considerable amount of time. I'm talking
25 months that we pumped water out these portals. At the

1 time --

2 Q BY MR. SMITH: Excuse me, Galen. How big of
3 a pump? How long by how long?

4 A It was either a 5 horsepower machine or 13.
5 The three-inch water line. In fact we had two of them in
6 there at one time. The main water line we had a six-inch
7 water line going down into this area. But we pumped out
8 here because we couldn't get rid of it, and it was
9 backing up on us so much that we had to get rid of the
10 water.

11 We didn't have a permit to pump this way.
12 So it was kind of a hush deal when we done it. We pumped
13 and pumped and pumped. I lived up the canyon, drove down
14 past this every day. One morning coming to work there's
15 water running across the road at Birch Spring. Our water
16 finally reached the bottom of the canyon. So when we got
17 up at the mine, we talked about it, what the heck are we
18 going to do.

19 So at that time they went down into the old
20 workings. We had a seal. A seal is installed. You're
21 familiar with that. It's not supposed to be breached.
22 We went and breached the seal, knocked a hole in it. We
23 stuck pipe through it. We pumped the water that was
24 going here into here, and we continued to pump till the
25 water come out all the way. Along in January, February

1 there was icicles hanging off the ledges all the way
2 around the mountain.

3 We kept pumping and we kept pumping. We had
4 a federal inspector come in one day. He found the seal
5 with the hole in it. It wasn't sealed any longer. We
6 had to seal it up. We could no longer pump that way.
7 That's why we quit pumping that way.

8 The line when it come down in here, even
9 after that time there was a pipe installed again.
10 Six-inch line had a three-inch line that went outside.
11 There was a valve.

12 Your permit with the meter on it down here
13 says you can put so much water out. We put out so much
14 water. The rest of it went back in here. Whether it's
15 that way today I have no idea. I doubt that it is. But
16 that's what we did.

17 As we mined this area up in here, this is
18 really wet up in here. It is wet. This entry and these
19 entries were. The rock split or the coal seam split. We
20 had rock about that thick; had about three to four feet
21 of coal underneath, about that much rock, and then some
22 coal above it. Tried mining it two or three times while
23 I was there. It was just too much rock. It wasn't
24 feasible to mine it.

25 So we pulled out. We went back around

1 here. We drove this one down, come here and drove it
2 back this way, and then we come in here, around what we
3 call the east bleeders, and drove it up clear up to the
4 end of their permit boundary, and we pillared it.

5 Well, we got back in this area back here,
6 started pulling out. We could not get air to release.
7 We got black damp in there. Black oxygen. Federal come
8 in and shut us down.

9 So what we had to do is we come down here
10 and put a tunnel through. Where is the map of the
11 tunnel? This one don't show it. Anyway, there is a rock
12 tunnel that goes from this section here into this
13 section, so we could draw the air back out through this
14 and use this as a return so we could mine this.

15 As soon as we got that done, this was a
16 little bit of a downhill slope. From here to here the
17 water, we let it build back up in here. Water run
18 through the tunnel and filled this area up. As they come
19 back out, we pulled everything on both sides. This map
20 doesn't show it, but we pulled out past the portals. We
21 sealed the portals.

22 At the time that we were sealing the portals
23 we discussed what we could do to help get rid of some of
24 this water when it fills up. Now at the time I was over
25 the drilling as far as when Earth Facts come in and done

1 their test holes over here in this area and the other
2 areas of the mine.

3 We went over by these portals and we drilled
4 some holes in the floor; drilled them out at an angle so
5 that the water would go out at the surface. Down where
6 the creek runs right down here, right along here. Then
7 we continued to mine this on out, and they finished this
8 up. And basically that's the way we handled it.

9 We done what we had to to get rid of the
10 water, knowing that we only had a permit down here. I
11 don't know what it is, 106 or something gallons. But it
12 is also a fresh water permit to discharge.

13 So what that says is you have to let that
14 water sit someplace. It supposedly runs across some type
15 of a skimmer to get rid of the oil. Dear Creek Mine has
16 one right near the portal there. We didn't have anything
17 to pump it back into an area, let it sit till it looked
18 good and then pump it outside.

19 Q Now Galen, when you say "what we did," who
20 made the decisions on how water was moved around inside
21 the mine or whether it was discharged or not discharged?

22 A The mine managers.

23 Q That wasn't -- you weren't the one making
24 the decisions?

25 A No, no. I didn't make the decision as to

1 what. I was part of the management people. The decision
2 was made, take your guys and go do this and go do that.

3 Q So this was made by the management of the
4 Co-op Mine?

5 A Yeah.

6 Q During the time -- you're familiar with the
7 time when we had the big spike increase and flow in Birch
8 Spring and also the increase in Bear Spring. There was
9 also a decrease in water quality, and I want to ask if
10 you're familiar with how any of these substances could
11 have got into the water that you were discharging or
12 moving around inside the mine? One is oil and grease.

13 A That's real easy. Your equipment in the
14 mine runs off hydraulics, so it has hydraulic oil in it.
15 All of that equipment, you break a hose, water, oil goes
16 in the water.

17 In fact, in any of your mines you go around
18 anyplace there's water, you've got your rubber boats,
19 you've got scum on your boots like that where the water
20 comes up to it. All coal mines are that way.

21 Q So there was -- you personally saw a lot of
22 instances where oil and grease got into the water inside
23 the mine?

24 A Oh, yeah. We had in this section, this is
25 an X. We was in this section right here mining. We had

1 an old 455. I think it was a 455 Lee Norse continuous
2 miner that has probably a 250-gallon oil tank on it. We
3 blew the main and within two minutes it poured 250
4 gallons of oil right on the ground, and it's sitting in
5 water about that deep.

6 Now where is it going to go? It's going to
7 go down to the sump and it's going to get pumped out.
8 That's why they put it back in an area, they call it
9 sump, and to let it sit and hope it will float off.

10 One other trick we try to do to get rid of
11 water without the oil, stick the pump so the pump is all
12 below the oil so the pump could skim off the top and stay
13 there and you would pump below it. That's common in all
14 coal mines.

15 Q How about fecal coliform?

16 A Same thing. In a coal mine, it's kind of a
17 little joke. The federal law says you will have a
18 Port-a-potty for the kids to use. The joke is you use it
19 you clean it. The thing just sits there in the box
20 forever. All coal mines are that way. So everybody goes
21 to the return.

22 Q The return being?

23 A The whatever this when we developed this
24 down, the return would have been on the right side, so
25 all these entries back here. You go back in the woods.

1 So that's where it's at.

2 Q So people would urinate and defecate inside
3 the mine?

4 A Yes.

5 Q So that could be mixed in with the water?

6 A All coal mines. Same in all of them.

7 Q How many people -- when you were working
8 there, how many people were working in the Co-op Mine?

9 A 60 approximately. Around 60 underground.

10 Q How many shifts did they have there?

11 A Three.

12 Q Three shifts?

13 A Worked all three shifts.

14 Q And how many on each shift?

15 A 60 total.

16 Q So 20 on each shift about?

17 A That --

18 Q Some shifts, one shift may be bigger than
19 another shift. Okay. How about sulfates?

20 A Your coal has sulfates. Your coal has
21 sulfur resins in it, but there's rock dust, a lot of
22 chemicals. We use calcium chloride on roadways --

23 Q Okay.

24 A -- to keep the dust down. It collects the
25 moisture and keeps the dust down. Federal law says you

1 keep the dust down. So you do what you have to do.

2 Q So rock dust?

3 A A lot of rock dust, which is limestone,
4 gypsum. We use a lot of gypsum.

5 Q Gypsum was used. And that would have --
6 okay. Were you in charge, also in charge of water
7 sampling?

8 A At different times. In fact the second day
9 I started there they had me go take a water sample. We
10 went up here down off in here. Right up in here, boy,
11 there's the nicest little drip you ever seen come out of
12 the roof. Nice really good drinking water. And that's
13 what I sampled. The sample was taken out, was given to
14 the -- I don't know who done their sampling at the
15 time. I think Mel Coonrod was doing the sampling. It
16 was labeled and given to him. What it was labeled for I
17 don't know.

18 But I don't think that was our sampling
19 point. There was a dripper inside the main there. It
20 was to sample the water that was supposed to come outside
21 of the well that sits outside the discharge point.

22 Q So these are samples for DOGM?

23 A DOGM samples.

24 Q So they're supposed to be the samples of
25 what you're discharging out of the mine. Any metering or

1 any sampling on the discharge point that you were talking
2 about being done?

3 A Here you mean or over there?

4 Q Yeah.

5 A Over there. We didn't have a permit.
6 Surely we wouldn't do that because we didn't have a
7 permit to discharge over there.

8 Q So there's no meter there either?

9 A In fact as soon as we started pumping, when
10 it run across the road down here, we knew we was in
11 trouble, and we went to pump in here. We went and they
12 removed the pipeline, the pump, everything that we could
13 to get it out of there.

14 But the last I was up there you could still
15 walk out. You can walk out that portal right there where
16 the gate and stuff is. You go out there and walk around
17 the hill. You can see this is where there's evidence
18 that the water has been pumped out the hill. There's a
19 gully about that deep and about that wide where the water
20 shot off down the hillside just around there. Since I've
21 left they put a fan in over here. So what they've done
22 different I don't know.

23 Q How about fractures and faults? Were they
24 commonly encountered in the mine?

25 A Oh, quite often. When you first -- well,

1 you can see it right here. When you first come in the
2 mine by the shop, there is a little step fault there
3 where you come up and go over the top of that. There was
4 another one over right here going into the east. You can
5 see the two faults.

6 This one right here was rock. It was quite
7 a fault. It was low. We was able to get around it, but
8 up here I don't know what the displacement was from this
9 side to this side, but it was solid rock all the way
10 down. Reason I know, we mined down all the way solid and
11 pulled all the coal out. So all the coal here is gone.
12 And everything out here to the dirt is gone.

13 There's faults. A lot of the faults they
14 don't show up on here. What you'll have is in your top
15 as you go along, you'll have a small area, maybe even
16 that wide, where it's like a fracture. It's not really a
17 fault. When you go through it you can't evidence
18 anything there when you're mining. It's not like you hit
19 a rock wall or a step fault or anything like that.

20 Q Uh-huh. When you encountered -- when you
21 said you were moving to the north you encountered some
22 very wet areas?

23 A Mm-hmm.

24 Q Was the water above the coal seam? Below
25 the coal seam? In the coal seam? All of the above?

1 None of the above? Where was the water?

2 A Basically all of the bottom. Where it was
3 really coming from was on top of the rock. You had your
4 lower coal, you had rock on the bottom, then your coal,
5 then you had rock. Oh, but from that I think to get it
6 about as thick as four foot.

7 And the water as you mined in was coming off
8 the top of that rock above the coal. It would come off
9 and then run down. And then as you'd drill your holes to
10 roof bolt it, the water would just pour out of it. It
11 was really wet.

12 In fact they put -- let's see where the
13 overcast is at. Right over here somewhere. We put in
14 some metal overcast and they had the pumps clear back
15 here. Big pumps. I think they were 40 horse. Something
16 like 40 horse that were sitting here that we used to pump
17 out. And all this was running into this area.

18 Q I want to talk about subsidence for a
19 minute. Were you aware of areas of subsidence around the
20 mine?

21 A Not here. At one time your Bear Canyon Mine
22 sits over here. Not Bear Canyon, the Trail Canyon Mine
23 sits over here. And at one time when we was doing the
24 drilling, they had us take the diamond drill up, and we
25 went up right against this rock face here, and we drilled

1 holes trying to find that other coal seam, with the
2 thoughts that we might be able to drive a rock tunnel
3 through it and get back in here and mine this coal that
4 they hadn't mined from the other side of this fault.

5 And you went out the canyon here, went up
6 along this side. You could see some subsidence evident
7 up along this side of the canyon and you could also see
8 some -- don't see this, but it's back up here farther
9 where this ridge comes in. Actually it comes up like
10 that. You could see some along that site right there.
11 That's all that I really --

12 Q How close did you mine to the edge of the
13 rock edge?

14 A To the outcrop.

15 Q To the outcropping?

16 A Same as all coal mines do. The law says you
17 will leave a 200-foot barrier. And I think if you look
18 at any coal mine map there is, it will show a 200-foot
19 barrier out there. Every mine I've worked at you mine to
20 the dirt. You get out as much coal as you can.

21 In fact we've had BLM people come in in this
22 mine, do not leave that coal. You get everything that's
23 there. BLM's in charge of the coal. DOGM's in charge of
24 something else, if Federal's in charge of something
25 else. But they'll come in and tell you you get that

1 coal. You don't leave it. So that's what we done. We
2 mined out just as far as you could go and as it was safe
3 that you could mine it.

4 MR. CARTER: Just out of curiosity, what
5 happens as you get to the edge? Is it broken up or is it
6 burnt?

7 THE WITNESS: Depends. Some places it's
8 burnt. It's really hard to say. Some mines it's solid.
9 I mean it's solid always all the way out, and you go out
10 and all of a sudden you start loading up dirt, so you
11 stop. But it was a common practice. Co-op when I worked
12 there, their extraction rate was excellent. I mean they
13 got the coal out. They didn't leave it in there. A lot
14 of places they'll leave coal in there. But Co-op
15 didn't. They got all that they could save and get. They
16 got it.

17 MR. CARTER: Another question I have is were
18 there some bore holes that were drilled to drain water?

19 THE WITNESS: Yeah. That was over here.

20 MR. CARTER: Where were they done?

21 THE WITNESS: Right by the east portal.
22 Showing here, yeah, right here. When we come back past
23 this, this was drove out from the inside here. We had to
24 seal it up.

25 What we done, we went in there and they

1 hauled gravel in the mine, they put in a little conveyer
2 deal, and they shoveled dirt on it, and it went out until
3 they just filled it from the portal back in, and then
4 they built a seal in front of it. In fact I think they
5 built two seals in front of the portal here so, you know,
6 nobody could ever get in, so it was sealed.

7 And that was according to I think DOGM had
8 some regulations on how we had to seal this. Federal
9 does too. They come and inspect it and everything. We
10 went right in here just in front of it and drilled on an
11 angle down just for the possibility that some water would
12 drain there, that we could get rid of some of it.

13 MR. CARTER: How many bore holes did you do
14 there?

15 THE WITNESS: I can't remember. It seems
16 like we drilled three or four. But I can't remember for
17 sure how many it was. They were, oh, probably about
18 two-inch holes.

19 MR. APPEL: Was there a permit to do that?

20 THE WITNESS: I wasn't in charge of the
21 permitting. I don't know for sure.

22 MR. APPEL: I just want to understand. So
23 are you saying that what was metered for the purposes of
24 the discharge permit doesn't represent all the water that
25 was pumped out of that mine?

1 THE WITNESS: No.

2 MR. APPEL: Okay.

3 Q BY MR. SMITH: Could you say what
4 percentage? Any idea?

5 A I don't know. It's really hard to say.
6 Just like I say, it depends. At Co-op we had a real bad
7 habit of moving sections. We'd mine here and you'd come
8 in the next day and they'd say okay, you're going to mine
9 over here. We'd pull everything out and mine over here,
10 and then we'd go back.

11 So it's hard to say depending on where we
12 was at, where we was mining what the water conditions
13 was. But at times there was a lot of water, a lot of
14 water.

15 MR. APPEL: Did that water only come from
16 the roof or did it come from the walls and floor?

17 THE WITNESS: Most of it come from the
18 roof. Other than this area up in here.

19 Now this was leading into what they call the
20 graben area. I remember one time we had the engineers
21 from Cypress Plateau come over. They were mining over
22 this way, and they were worried about getting into that
23 graben area and disturbing the water, hydrological
24 stuff. They come and looked around up here, and we
25 discussed things quite a bit about what was going on

1 there, and it -- most of it come out of the roof.

2 MR. APPEL: What did you decide in
3 consultation with those people from Cypress?

4 THE WITNESS: I don't know. We -- it's
5 kind of an uneducated guess really is all you're kind of
6 doing. We didn't have very much information. We didn't
7 have bore holes up here in the mountain. We didn't --
8 you know, Utah Power and Light, they spent a lot of
9 money; they know what's ahead of them. We didn't. We
10 didn't spend any money on doing that kind of stuff, so
11 you just kind of took it as you went. So it's kind of
12 hard to --

13 MR. APPEL: But as you got up to that area,
14 there was a noticeable increase in the amount of water?

15 THE WITNESS: Oh, yes, yes.

16 MR. APPEL: And it didn't all come from the
17 roof?

18 THE WITNESS: Well, I'm not saying what's
19 the roof. I mean you got -- if you got -- say this is
20 your roof and you got coal down here and you've got rock
21 that thick, and it's come out right here and there's some
22 coming out of there. That's where it's coming from.
23 Some's the roof, some's not.

24 MR. MORRIS: Ben Morris, Utah Division of
25 Wildlife. You mention that you had taken one of the

1 samples from inside the mine and gave it to Mel Coonrod
2 as though it was the sample coming out of the mine
3 portal.

4 THE WITNESS: I gave it to the
5 superintendent. The superintendent gives it to Mel
6 Coonrod, as far as I know.

7 MR. MORRIS: Do you know if Mel Coonrod was
8 aware that that wasn't --

9 THE WITNESS: I have no idea. All I know is
10 he was our tester.

11 Q BY MR. SMITH: Was that commonly done?

12 A That's the first time I'd ever been involved
13 in the testing there. I took samples a few times. I
14 come in, they gave me a pitcher. The superintendent says
15 go over here and get a water sample.

16 So you go over and get your water sample.
17 And it come out. Mel had to make a report. I don't
18 remember how often it was because he had to make his
19 report out, and all he got was the samples that were
20 given to him. So that's what he went by.

21 I do know when I was working with DOGM, we
22 come to the well that was down here that they were
23 supposedly testing; it wasn't serviceable.

24 Q So you couldn't take a sample out of the
25 well?

1 A It was clear full of water. It had to be
2 dipped out. I think on that well test down there that
3 had to be dipped out. All the water had to be dipped
4 out, the depth had to be taken. It was just a regular
5 piezometer test down there and then a sample taken on
6 that. And then they come up there, the lid was broke
7 off. In fact I think we got a big violation over that.
8 No, I know we did.

9 Q But it was more than one time that the
10 sample was taken from --

11 A I was involved as far as being told take a
12 sample in this one certain area three times that I can
13 think of.

14 Q And these were supposed to all be discharge
15 samples?

16 A As far as I know that's what they were for.

17 MR. APPEL: Do you know where Big Bear
18 Springs is on that map? Can you point it out?

19 THE WITNESS: Well, I'm guessing, Big Bear.
20 There's one right behind the ballpark. Do you know where
21 the ballpark is?

22 MR. SMITH: Yeah, that's there.

23 THE WITNESS: Now where it's on on here,
24 let's see. It would be probably right in here, either
25 this one or this one. Right in here somewhere is where

1 it would be.

2 MR. APPEL: Okay.

3 THE WITNESS: Right by the ballpark is where
4 it's at.

5 MR. APPEL: Okay.

6 MR. CARTER: Any questions from Co-op? I
7 keep saying Co-op. CW Mining?

8 MR. M. HANSEN: Doesn't look like it.

9 MR. CARTER: Okay.

10 MR. SMITH: Thank you, Galen.

11 THE WITNESS: Can I go now?

12 MR. SMITH: You can go.

13 MR. CARTER: I think we were going to let
14 Mr. Hansen respond to -- or excuse me, what we were
15 characterizing as argument there before we broke for
16 lunch.

17 MR. APPEL: His reply.

18 MR. CARTER: No, after lunch. His reply.
19 I'm sorry.

20 MR. M. HANSEN: So we're shifting gears.

21 MR. CARTER: Well, I think the first
22 question is does this, the factual testimony that we just
23 had create a need for you to address additional
24 information?

25 MR. M. HANSEN: I think I need to respond

1 more to some of the arguments that were made than the
2 facts.

3 MR. CARTER: Okay.

4 MR. M. HANSEN: As far as Mr. Atwood's
5 testimony, I would point out that his testimony doesn't
6 go to the issue that is before the court. And I would
7 like to start by pointing that out again. The water
8 users have sought to somehow put the burden on Co-op Mine
9 to say that in this proceeding that we have an obligation
10 to prove that the permit area is hydrologically
11 isolated. I heard somebody say that. That's not what
12 this proceeding is about. And in fact we are trying to
13 show that. But we've never had that burden to meet.

14 In this proceeding, the burden is on the
15 water users to show that our -- in our permit, the
16 proposed operation has not been designed to prevent
17 material damage to the hydrological balance outside the
18 permit area. The mine is entitled to the production that
19 the operation is designed to do, and it's the water
20 user's burden to come forward and rebut that prosecution,
21 to show by a preponderance of the evidence that our
22 permit, the operation has not been designed to prevent
23 material damage to the hydrological balance outside the
24 permit area.

25 Now what this proceeding is all about,

1 Mr. Atwood's testimony, and if we don't win on this
2 motion, we'll go forward and put on all kinds of rebuttal
3 testimony, because it was an eye-opener, and it's quite
4 incredible.

5 But at this point, if you buy everything
6 that he says, which isn't true, but let's buy everything
7 that he says, he is saying that there was an isolated
8 incident years ago where somebody violated a part of the
9 permit, and since it's been addressed, it's dealt with,
10 it's no longer done. That's what his testimony boils
11 down to, even if you accept it. I don't think you
12 should. But even if you do, that's all that his
13 testimony boils down to.

14 That's irrelevant of the issue that's before
15 the Division at this point, which is designed to prevent
16 material damage. And I still go back to the point that
17 it isn't, or that it is designed, and that the water
18 users have failed to rebut. We have this referenced up
19 to a DOGM letter that was introduced through
20 Mr. Leamaster.

21 Again that DOGM letter was already in the
22 record. And DOGM was already aware of all of the facts
23 in that letter. And those facts, again, they deal with
24 the same issues that Mr. Atwood addressed, and for the
25 same reason it's not relevant to the issue whether the

1 permit should be renewed at this time.

2 There's been some kind of argument that this
3 pumping in the old works led to a discharge which
4 affected Big Bear; that the water users' own evidence
5 shows that there was nothing substantively negative that
6 has ever happened to the water quality at Big Bear
7 Spring. That was their evidence in the tank seam
8 hearing. That was their evidence before the Division
9 during this hearing, that there's never been shown to be
10 a negative impact to the quality of the water coming out
11 of Big Bear Spring.

12 Their argument has been made that at one
13 point there was an increase in the quantity. Now that
14 doesn't show an injury. If anything I think that would
15 show a benefit. And again, even if we're -- even if we
16 accepted all that information as true, what they are
17 talking about is what happens if water is discharged to
18 the surface. They're talking about a surface
19 connection.

20 And even if there was an increase, that does
21 not establish a deep water connection such as the
22 connections we're talking about would have to exist with
23 Birch Spring, for example. And again the increased water
24 flow even if we attributed it to this incident that
25 Mr. Atwood testified to deal not with underground effects

1 but with surface effects and with violations of mining
2 permits, not with whether the permit itself is adequate.

3 And that is what all that evidence points
4 to, and it does not militate against renewing the
5 permit. If anything it would have militated in favor of
6 issuing an NOV five years ago. And we would submit that
7 it's long past time to do anything about that, that it,
8 again, even if anything like that had happened, it's
9 water under the bridge, so to speak, and it hasn't been
10 shown to ever happen since then.

11 The permit is designed to prevent that from
12 happening, and that is what has to be shown.

13 Mr. Smith argued that the Division needs to
14 take a hard look at that situation. I don't have any
15 problem with that. But again I think if you take a hard
16 look at the situation, that the evidence to the extent it
17 is not inclusive is irrelevant to the issue before the
18 Division at this time.

19 Mr. Appel argued, he argued before the
20 Board, he's argued before the Division before, that the
21 big question is if something happens, where is the
22 replacement water? As if there's something in the rules
23 that require that. And we have argued before the
24 Division before and before the Board before it had been
25 upheld in that ruling and been affirmed in that ruling,

1 that the rules do not require doing what Mr. Appel would
2 like to have done in that regard.

3 The permit doesn't have to identify a
4 replacement water source. There's nothing in the rules
5 that require it. What it does require is the showing
6 that the operation has been designed to prevent a
7 material damage to the hydrological balance outside the
8 permit area, and it does. The water users, the water
9 users are just simply in error as a matter of law on the
10 legal point of whether that's a requirement. It is not.

11 And the issue has already been resolved by
12 the Division before. It has already been resolved by the
13 Board before. There's been some discussion about Plate 7
14 in Exhibit 4, which I referred you to before, and I would
15 submit that the Division doesn't need to rely on the
16 arguments of counsel or on the arguments of expert
17 witnesses as to what the contents are in that plate. You
18 can look at the contents yourself and make your own
19 findings and come to your own conclusions as to what that
20 data shows.

21 And I again submit that the data shows that
22 based on Mr. Nielsen's testimony, there was an earthquake
23 incident in the area in mid-1988 and as a direct result
24 of that earthquake incident the water flows dropped off
25 in apparently several springs in the area. And that is

1 the cause of the water dropoff.

2 Mr. Appel argued that the tank seam hearing
3 and the findings out of that hearing aren't binding
4 here. We haven't argued that they are. I think we've
5 already explained and covered what the impact of those
6 findings should be: As Mr. Appel said, that the water
7 users have taken new samples, they've provided new
8 information.

9 But as I already pointed out, the
10 information, both the chemical analyses and the tritium
11 analyses do not differ significantly if at all from the
12 same information that we've already had before the
13 Division and before the Board, and they confirm the
14 findings rather than contradict the findings that were
15 already made.

16 The argument has been made that we are
17 taking what is claimed to be a unique position, that our
18 permit is the only area in the whole region that is not
19 heavily fractured. The only information we have
20 regionally about the degree of the fractures is really
21 taken from surface examinations, not from detailed
22 underground reviews.

23 And conclusions that have been reached from
24 examining the surface fractures, assumptions that have
25 been made about how far they extend underground, our

1 actual experience has shown that whatever the surface
2 fractures show you, those fractures do not permeate the
3 area, that we do not have fractures throughout the permit
4 area.

5 And I think that's about it.

6 MR. CARTER: Okay. Let me -- I have a
7 couple of questions that I want to pose. I'm hoping
8 there's chalk over there because I'm going to draw
9 diagrams. Oh, good. Maybe I'll just start out by asking
10 Mr. Nielsen, this may be too simpleminded, but I want to
11 make sure I understand what people are saying.

12
13 PETER NIELSEN,

14 recalled as a witness, for and on behalf of the
15 Plaintiffs, being previously sworn, was reexamined
16 and testified as follows:

17
18 FURTHER EXAMINATION

19 BY MR. CARTER:

20 Q So this is Huntington Creek, and we have
21 relatively I guess slightly dipping beds, because you
22 you're saying --

23 A Four degrees.

24 Q Fine. Very slightly dipping beds.

25 A Almost horizontal.

1 Q So we've got something like this, and then
2 we have this regional aquifer. I won't call it regional
3 aquifer. We have the lowest aquifer, which dips
4 something like that.

5 A Yeah. And that's the Spring Canyon
6 sandstone information.

7 Q Okay. The Spring Canyon sandstone is right
8 at the top of the --

9 MR. C. HANSEN: Now the way you've drawn
10 your line, is that the north end?

11 Q BY MR. CARTER: Yeah, something like that.
12 And in general terms, the Blind Canyon seam, everyone was
13 agreeing that the north end was getting, they were at the
14 same elevation at some point; right?

15 So my question would be if you were -- and I
16 don't mean to ask this in a pejorative sort of way, but
17 even if you put on a real high volume pump and you drill
18 holes and you tracked all this and you started sucking
19 water out of this as fast as you could rather than just
20 letting it drip in or come up from the surface, wouldn't
21 you really have to pump like crazy to get a cone of
22 depression big enough to affect this spring? I mean if
23 this is -- do you see what I'm saying?

24 A I see what you're saying. The information I
25 have right now is based on wells and water levels in a

1 preexisting mine. You don't know what premine baseline
2 flows is in the Spring Canyon sandstone. It may have
3 been several feet higher than it was now which was
4 supplying that spring until it was mined into and
5 dewatered.

6 Q So what you're saying is over a long period
7 of time this could just generally depress the whole
8 surface rather than creating a cone?

9 A Exactly. Lines in his study that he did on
10 East Mountain showed that this stuff happens anywhere 45
11 to 50 years before you establish a steady state.
12 Typically in those you'll have high flows in the
13 beginning, and that tapers off to some steady state flow,
14 whatever that will be. And you'll generally depress the
15 water table or the water service around the -- beyond and
16 beyond the actual mining part.

17 That's consistent with what Lines found.
18 That's consistent with what McHorter found in studies
19 over in Colorado, as stated by several studies in
20 Illinois and West Virginia, that you do dewater beyond
21 the boundaries of the mine to some steady state point.

22 Q That would be the areas that would be below
23 the piezometric surface, wouldn't this?

24 A Yes.

25 Q If all of this -- if the coal were here and

1 it was all in saturated, I mean the coal was saturated
2 and everything above and below it was saturated, clearly
3 you probably couldn't mine it. The water just might blow
4 you right out of the mine, depending on permeability and
5 stuff?

6 A Yes.

7 Q I think I'm understanding the argument to
8 be, and I think people would agree, that a molecule of
9 water that was on its way here could well show up at the
10 working face of the mine and never make it down here?

11 A Exactly.

12 Q A molecule or maybe some quantity of water,
13 but that I guess the question really was if -- would
14 drainage into the mine here under a condition of not
15 pumping and fairly low pressure because you're at or just
16 below the piezometric surface depress the piezometric
17 surface this far away?

18 A It would lower the hydrologic head that's
19 supplying the spring.

20 Q The right of flow?

21 A Yeah, the right of flow.

22 Q I want to understand the question clearly.

23 MR. APPEL: Can I add one portion of that
24 here?

25 MR. CARTER: Sure.

1 MR. APPEL: It's not operating as a cone
2 depression. As I understand it it's that the water
3 that's come out towards the path of the historic spring
4 is diverted to another place, in this case the portal.

5 Q BY MR. CARTER: And I would say let's say
6 there's water on this way. Vertically this water is
7 basically moving horizontally because it's reached this
8 aquitard, whatever is underneath it, but the water that's
9 percolating down here certainly where it hits the roof of
10 a mine, it will fall into the mine, go into a sump and be
11 disposed of someplace rather than go where it would have
12 gone otherwise.

13 But I think that the testimony was that this
14 phenomenon is really only happening up here very close to
15 the piezometric surface, and out here farther there's not
16 a lot of water coming out of the roof. And I know
17 Mr. Atwood's not still here.

18 A Well, that would follow. I think I know
19 what you mean, is that as you're mining you usually
20 intercept your water in the face as you were moving, and
21 it dries up behind you. Essentially you're dewatering
22 the roof as you move from some point.

23 And that could be a combination of
24 intercepting that potentiometric surface or dewatering
25 the first aquifer. In either case I think it doesn't

1 matter. There's enough fracturing that it's -- that
2 it's recharging one or the other or it's still moving
3 south, for that matter.

4 Q Okay. I've got one more lateral question;
5 then I've got an aerial question. If the old workings
6 are out here close to the face, I mean is it a safe
7 assumption that whatever fracturing exists, it's likely
8 that because of less loading out here the fractures are
9 going to be wider? I mean there would be -- I guess
10 what I'm trying to say is it would seem to me there would
11 be greater fracture permeability up close to the cliff
12 face than there would be deep inside the mine.

13 So if you brought a bunch of water out here
14 and sort of stacked it right out here against -- as
15 Mr. Atwood said, against the dirt, you may be just in
16 sort of the spring protection zone, if you can call it
17 that, of this spring, and that the influence is fairly
18 localized. I mean because there's lots of fracturing out
19 here and not so much back here. So you could be opening
20 things up.

21 And I guess what I'm saying is that there
22 may be a different flow regime right here close to the
23 cliff face than there would be back here in terms of -- I
24 mean you could have very high vertical permeability right
25 here and less high back here.

1 A That's probably true. I would also say that
2 having worked in the mine, I noticed that we would mine
3 through areas that were fractured and they dewater and we
4 would have water ponded on the floor in the same area.

5 Q So it's real localized?

6 A That suggests to me that even though we do
7 have fractures, the mining operation, and I assume those
8 fractures were saturated before we got there, is that the
9 mining operation can seal off the fractures, whether, you
10 know, mud are introduced or rock dust or basically
11 destroyed during the mining operation.

12 So some areas may be porous, have
13 permeabilities, and some areas may be sealed. We saw
14 that typically where we had ponded water all over the
15 place, it stayed ponded.

16 Q This is the aerial question. And this one
17 is -- this will be easy. If you have basically a big
18 trench that's basically fault bounded, I mean which is
19 what I think we're talking about, and it's tilting, it's
20 dipping that way, part of one of the theories you're
21 advancing is that mining in this area, or wherever the
22 permit is, in subsidence of that area does create
23 fracturing that wasn't there before mining and may have
24 created fracturing that created hydrologic connections
25 where they didn't used to exist. I mean at the actual

1 flow path of water underground through this area would be
2 altered by the mining and the subsidence and the
3 fracturing.

4 A I wouldn't say it introduced additional
5 fracturing. It just either enhances or closes fractures
6 that exist.

7 Q So it would be not so much the theory that
8 the mine has captured water or captured a lot of water
9 that otherwise would have come out at that one spring but
10 that it has altered flow patterns in that area?

11 A Think it's both. It's both altering flow
12 and capturing water.

13 Q I wanted to understand the theory.

14 A Yes.

15 Q It's the simple-minded.

16 A If it wasn't capturing water, they wouldn't
17 have to pump it all over the place. They'd have to pump
18 it in for dust control.

19 Q Okay. That's all I have. Thanks.

20 MR. CARTER: Okay. Let me make an
21 observation here. I think -- I mean we're closing in on
22 the end of the day. I understand Mr. Hansen to be
23 saying -- excuse me, basically making the argument that
24 he does not believe that the opponents, excuse me, have
25 met the burden that they need to meet and believes that

1 the Division should make a determination about that prior
2 to his going forward with the case.

3 In other words, if the Division decides that
4 the burden has not been met, then there's no need to put
5 on rebuttal evidence. I think I'm going to need some
6 advice in order to make that determination.

7 I mean I understand Mr. Smith's argument to
8 be that the Division must close the hearing before it can
9 make any substantive conclusions. So if I were to do an
10 analysis about the case that's been put on and then make
11 a finding, that would have closed the hearing, and there
12 would not be an opportunity for rebuttal.

13 I think I need to make a preliminary
14 determination about that in consultation with my
15 attorneys and then convey that to you to say that either
16 I'm going to make a finding and here's what it is, and
17 then you'll have an argument that I shouldn't have done
18 that. Or I'll say I'm not going to make a finding with
19 regard to that. I'm going to leave the record open. If
20 you've got anything to tell me, tell me now or tell me at
21 some time to be scheduled in the future. And in that
22 case I assume you'd be aggrieved by that. So --

23 MR. M. HANSEN: We wouldn't be aggrieved by
24 it. I think you've rephrased about what we were saying.

25 MR. CARTER: Okay.

1 MR. M. HANSEN: The point is that if the
2 water users haven't already given you enough to persuade
3 you, then there's no need to go any further. You can say
4 I'm not persuaded and close the hearing and rule against
5 them. If you thought it sounds persuasive, Co-op, I need
6 to hear your side of it; then we need to go forward.

7 MR. CARTER: Okay. Understand it. I think
8 I need some advice as to what we can do procedurally
9 regarding what I'm supposed to do, whether there's no
10 discretion of what I can or can't do. I like the sound
11 of you've got a lot of discretion. But I think I'd
12 better get some guidance on how much I've got.

13 So that's -- my plan is to close this phase
14 of the proceeding without announcing that they are
15 closed, get some advice, and what we may want to do is a
16 conference call with my assistant AG on the phone and
17 counsel for all the parties and talk about what kind of
18 guidance I've gotten and what that means and what you'd
19 like to do in response to that.

20 I'd like to try to telegraph what I think I
21 need to do in plenty of time for people to say, well, if
22 you're going to go that way, then this is what we want to
23 do, and we'd ask you to do that. Or if you're going to
24 go that other way, then we're happy with that and that's
25 what we want to do.

1 MR. APPEL: And you understand at the close
2 of whatever proceeding, be it at the summary stage or at
3 the end as Mr. Smith was discussing, we would intend to
4 give you a written report.

5 MR. CARTER: And that -- I think that's
6 fine. I mean again this is informal. I think something
7 in writing after I'd announced my decision would be
8 untimely. But --

9 MR. APPEL: What I'm saying is we have work
10 in process that we prepared to submit at this hearing
11 that is not completed yet.

12 MR. CARTER: Is it -- I guess I'd better
13 ask the question in terms of fairness. I think that will
14 need to be shared with Co-op and Co-op will decide to say
15 what they want to say or do about that, if they want to
16 make further argument to say this is stuff you've seen
17 before and you don't need to consider it or this is new
18 and we need an opportunity to formulate a response.

19 MR. APPEL: Well, the content of that report
20 depends upon whether or not they're going to provide
21 rebuttal witnesses because it would take into account the
22 theory that they do. You can't look at one half of it.
23 We can't be forced to look at half of the cake while they
24 get the whole cake.

25 MR. CARTER: I think what they're saying is

1 this is your show. And your show is we think the
2 Division made a mistake, and we think the Division ought
3 to revisit that, and here's why. So I hear them, hear
4 Co-op saying we think the Division did just fine, and
5 we're happy with what they've done.

6 And if the Division isn't planning on
7 changing what they've done, we don't have anything to
8 do. If the Division is thinking they ought to do
9 something else, then we have something else to say.

10 Now my question to my lawyers is can I
11 telegraph my punch or do I just have to decide I'm going
12 to decide this based on what I've got in front of me.

13 I see several options. One is I could call
14 everyone and say Co-op, you have to decide what if
15 anything you want to tell me. I'm not going to convey
16 anything. The record's open. What do you want to do?
17 And then you have to decide, well, we want to put on
18 additional testimony or we don't want to do anything. I
19 could say I don't see a quantum of evidence here that
20 would make me change my mind, and therefore I'm not, and
21 then you might say, well, we don't want to say anything,
22 and you might say, well, we've got additional evidence we
23 want to present.

24 I might say I see a quantum of evidence that
25 does change our mind, in which case you might say then we

1 want an opportunity to rebut it. What I need to do is
2 find out if I have sufficient flexibility to pick among
3 all those legally in the context of this informal
4 conference, or am I -- can I not telegraph my punches, I
5 guess is the best way to put it. Is this clear?

6 MR. APPEL: Actually it makes a great deal
7 of sense to me.

8 MR. M. HANSEN: I understood everything.
9 The only concern I have is the implication that the water
10 users after having closed their case are entitled to go
11 forward and put on even more evidence. Now if we want to
12 submit a written brief that summarizes the evidence
13 presented and make argument, that's one thing. But if
14 after the conclusion of this case they want to submit a
15 paper that contains additional evidence, I'm going to
16 object to it. Because they've put on their evidence.
17 This is their shot now.

18 MR. APPEL: This is not a formal proceeding,
19 Mark.

20 MR. SMITH: If we want to get back to the
21 formal thing, I think Co-op should be dismissed out of
22 this thing because they're not ready to proceed and
23 they've got an hour to do. They've convinced us to do it
24 in bites. And I'm comfortable with that, but what they
25 want to do is be hypertechnical and by the rules for

1 anything for us but for them, "We're not ready to go
2 today and our expert can't be here," and I just think
3 that's really unfair. We're just trying to get
4 everything out on the table.

5 MR. CARTER: I think the benefit here, I
6 need to be careful about how I say this. I think one of
7 the main beneficiaries of having a process like this is
8 the Division itself. I think the reason for that as I've
9 said early on is it benefits the Division to get all the
10 possible theories and information out there in front of
11 it before it decides something.

12 Because if we decide something and the Board
13 hears something de novo and there's a whole body of
14 evidence that the Division didn't have in front of it,
15 the Board is probably going to do something else, and the
16 Division would just as soon not be made foolish in front
17 of the Board. So I'm a beneficiary of this.

18 So it's in my interest to be relatively
19 flexible and relatively informal and keep the record open
20 and bring more information in.

21 Counterbalancing that is the information of
22 the folks that have requested the informal conference
23 which is to have their concerns heard in some sort of
24 timely manner, and the interests of the Permittee to be
25 able to go about its business if it's going to or begin

1 making changes if it needs to.

2 So among all of those, I'm not going to rule
3 right now on what happens if the information that is
4 presented is new. Let's cross that when we get to it.
5 But I'm -- I guess the best I can say is I appreciate
6 everyone's got an interest here and everyone's got a
7 somewhat different interest, and I need to balance those
8 to get all the information but to have timely
9 resolution.

10 So at least at this point what I'm going to
11 do is talk with my lawyers, get them to give me some
12 guidance on what I can do as a parameter for what I'd
13 like to do, and then I think perhaps before I do it we
14 ought to all talk in a conference call.

15 And if you feel you need more argument or an
16 opportunity to brief it or something like that, we could
17 do that. How does that sound?

18 MR. SMITH: That sounds fine.

19 MR. M. HANSEN: Fine with me.

20 MR. CARTER: All right. Well, then I think
21 unless there's any final thing that anyone wants to offer
22 at this point, I think we're concluded.

23 MR. APPEL: Don't say concluded. Done for
24 the day.

25 MR. CARTER: Excuse me. We're done for the

1 day.

2 MR. SMITH: There is -- I would like to
3 clarify one thing that in case -- well, I think I argued
4 it clear. I just want to make sure it's clear in your
5 mind is what our point is their PHC relies on the concept
6 of hydrologic isolation. And they had -- that's what
7 their PHC stands on. And if that's not true, their PHC
8 falls.

9 I didn't argue that they had the burden. I
10 just argued that if you look at their PHC, it's based on
11 that concept. If that concept's not true based on what
12 we've heard today, and I think they also argued that, but
13 if that's not -- if there isn't hydrologic isolation,
14 that's enough, I think, at that point. Then they've
15 got -- at the minimum you've got -- Division's got to
16 make them redo their PHC.

17 MR. CARTER: And I'm not -- I'll think
18 about this. But my concept of the PHC is the Permittee's
19 own analysis of what they think the probable hydrologic
20 consequences are. And then -- I mean that's -- we
21 shift the work burden onto the Permittee to tell us what
22 they think is going to happen, but that the really
23 critical document is the Cumulative Hydrologic Impact
24 Assessment which the Division prepares, and then uses as
25 a basis to decide whether or not there's any likelihood

1 for material damage to the hydrologic balance outside the
2 permit area. And that's the threshold question.

3 MR. SMITH: Right. In my notice it relies
4 on that PHC and comes to that same conclusion. So if it
5 comes in the PHC, the same faulty conclusion will be in
6 the CHIA and thus we still get back to the same point
7 that --

8 MR. CARTER: I understand.

9 MR. SMITH: -- that they haven't met their
10 burden in their permit. Now I understand we have that
11 burden to overturn that opportunity. But to have that
12 permit renewed, it's their burden to follow all the
13 regulations required for the permit, including
14 demonstrating there's not going to be damage to the
15 hydrologic area outside the permit area.

16 MR. CARTER: This is speech more than
17 anything else, but something the Division has realized
18 relatively recently is the CHIA needs to be a dynamic
19 document and that our Cumulative Hydrologic Assessment
20 may change over time because we should be reviewing the
21 information we're getting as we get it and saying to
22 ourselves, does this change anything? Are we still right
23 on track?

24 MR. SMITH: I think you've heard me say that
25 about a dozen times, that as new information comes in

1 things have got to be updated. And we would agree
2 wholeheartedly with that too.

3 MR. CARTER: And I would hold that the
4 decisions we make based on the information we had on the
5 front end would not change dramatically and that the CHIA
6 would change but would not change in such a way that it
7 would undermine the finding that we needed to make to
8 issue the permit in the first place. I mean that's --
9 that's the ideal. So I understand your argument. You're
10 saying there there's a faulty PHC and therefore a faulty
11 CHIA -- love these acronyms -- then we may have a faulty
12 permit. Okay. I understand.

13 MR. SMITH: That's it.

14 MR. CARTER: I'm not saying that's the case.

15 MR. SMITH: That's our point.

16 MR. CARTER: I just want to make sure I
17 understood the argument. I think that's it then.

18 MR. APPEL: So we'll wait to hear from you.

19 MR. M. HANSEN: I have one question. Am I
20 out of line in asking is there any other interested
21 person out in the community other than the water users
22 and the mine that intend to put on any evidence?

23 MR. CARTER: I had thought that there might
24 be, and this was heard second or third-hand, that one of
25 the operators, one of the other operators or several of

1 the operators may want to make argument or present
2 testimony. But is there anyone who knows anything about
3 that? It may well be that -- I would think they would
4 have been here today if they wanted to say something.

5 MR. REYNOLDS: Just for my case I have also
6 heard second or third-hand that there were some operators
7 that wish to do that.

8 MR. CARTER: And since this is informal and
9 publicly noticed, I would let people make comment. But
10 I'll ask. I'll ask some well-placed sources if they're
11 aware of any interest on any other party to participate.

12 All right. Thank you very much.

13 (The hearing was adjourned at 4:11 p.m.)
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C E R T I F I C A T E

STATE OF UTAH)
 : ss.
COUNTY OF SALT LAKE)

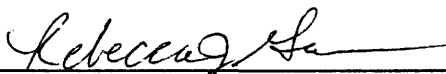
THIS IS TO CERTIFY that the foregoing hearing was taken before me, REBECCA J. GARNER, a Certified Shorthand Reporter and Notary Public in and for the State of Utah, residing at Orem, Utah.

That the witnesses were by me, before examination duly sworn to testify the truth, the whole truth and nothing but the truth in said cause.

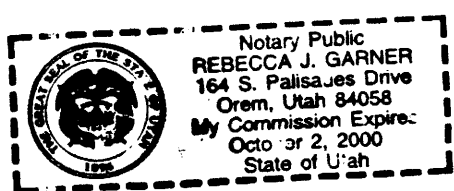
That the testimony in the aforementioned hearing, including the testimony of said witnesses, was reported by me in Stenotype and thereafter caused by me to be transcribed into typewriting, and that a full, true and correct transcription of said testimony so taken and transcribed is set forth in the foregoing pages numbered from 1 to 264, inclusive.

I further certify that I am not of kin or otherwise associated with any of the parties to said cause of action, and that I am not interested in the event thereof.

WITNESS MY HAND and official seal of Orem, Utah, this 18th day of November, 1996.


REBECCA J. GARNER, RPR
Utah License No. 328
California CSR No. 9823

My Commission Expires:
October 2, 2000



C E R T I F I C A T E

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: ss.
COUNTY OF SALT LAKE)

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Rebecca J. Garner

REBECCA J. GARNER, RPR
Utah License No. 328
California CSR No. 9823

My Commission Expires:
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